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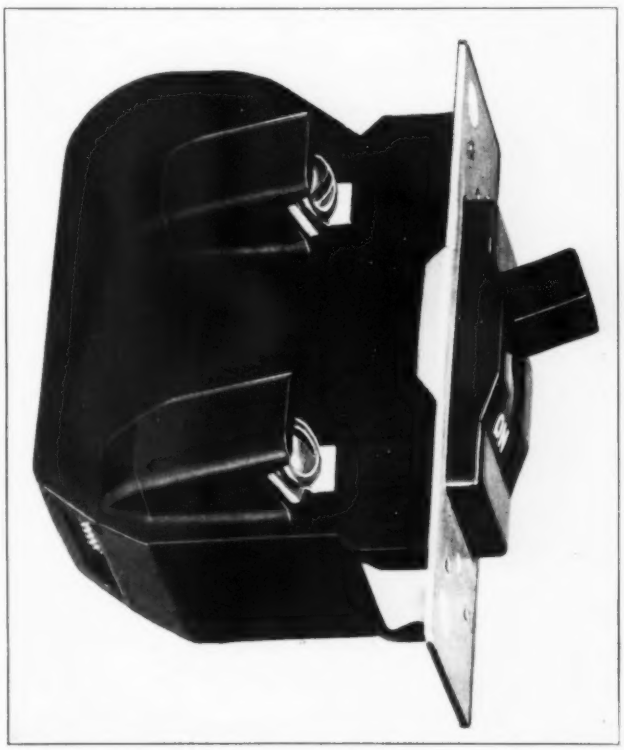

GENERAL ELECTRIC

WIRING DEVICES

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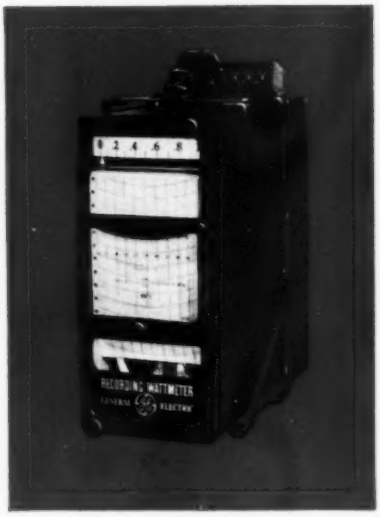

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ELECTRICAL CONTRACTING

With which is consolidated
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ENGINEERING

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for

ELECTRICAL CONTRACTORS
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ENGINEERS

SERVICE SHOPS

and others engaged in the business of electrical construction

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MAY 1936

Contributions

EVEN during the worst of the depression when the staff was down to the barest minimum and all activities not absolutely essential were curtailed, ELECTRICAL CONTRACTING has each year made some major extra contribution to the better business not only of the contractor but of the entire electrical industry.

AMONG such outstanding contributions have been a retail price service, a Buyers' Reference directory, the first complete analysis of changes in an edition of the National Electrical Code, the first complete course in electrical estimating, reinspection promotion, the first occupancy wattage tables for lighting, an analysis of "cost plus" pricing and billing methods, complete information on tools, only complete treatise on explosion-proof wiring. In every instance either the data was compiled by the staff from a thorough investigation or else the material was furnished by the leading authority in the country on that particular activity. In the case of the explosion-proof wiring presentation which was completed about two years ago, thousands of reprints were ordered and even now requests for quantities of these reprints are regularly received.

THE retail price service carried a standard for profitable prices into every part of the industry for the first time, and even now we receive many requests each year for a reinstatement of this service. The Buyers' Reference Number is proving a great value in locating sources of supply. Prior to our first analysis of change in the Code, the industry had no way of getting a complete picture. This work has been carried on each year since by N.E.M.A. The two estimating courses did more than anything else to build sound estimating practices. Reinspection is growing and in large measure this is due to the continued promotion by ELECTRICAL CONTRACTING.

AND now comes a contribution probably greater than any that have already been made—a Master Electrical Specification to appear in our June issue. It has been needed for years and it is being offered, as have all of the other special activities in the past, in the earnest hope that the results will be of great benefit to the electrical contractors and to the entire electrical industry.

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AN OPEN LETTER TO ELECTRICAL CONTRACTORS

GraybaR
ELECTRIC COMPANY, INC.

OFFICES IN 78 PRINCIPAL CITIES

TO ALL ELECTRICAL CONTRACTORS
INTERESTED IN FIGURING
SCHOOL ELECTRICAL WORK

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Our services are by no means confined to the School Field, but with the great increase in School Building we felt you might be interested in this work particularly. Write, phone or call at our nearest office for full information.

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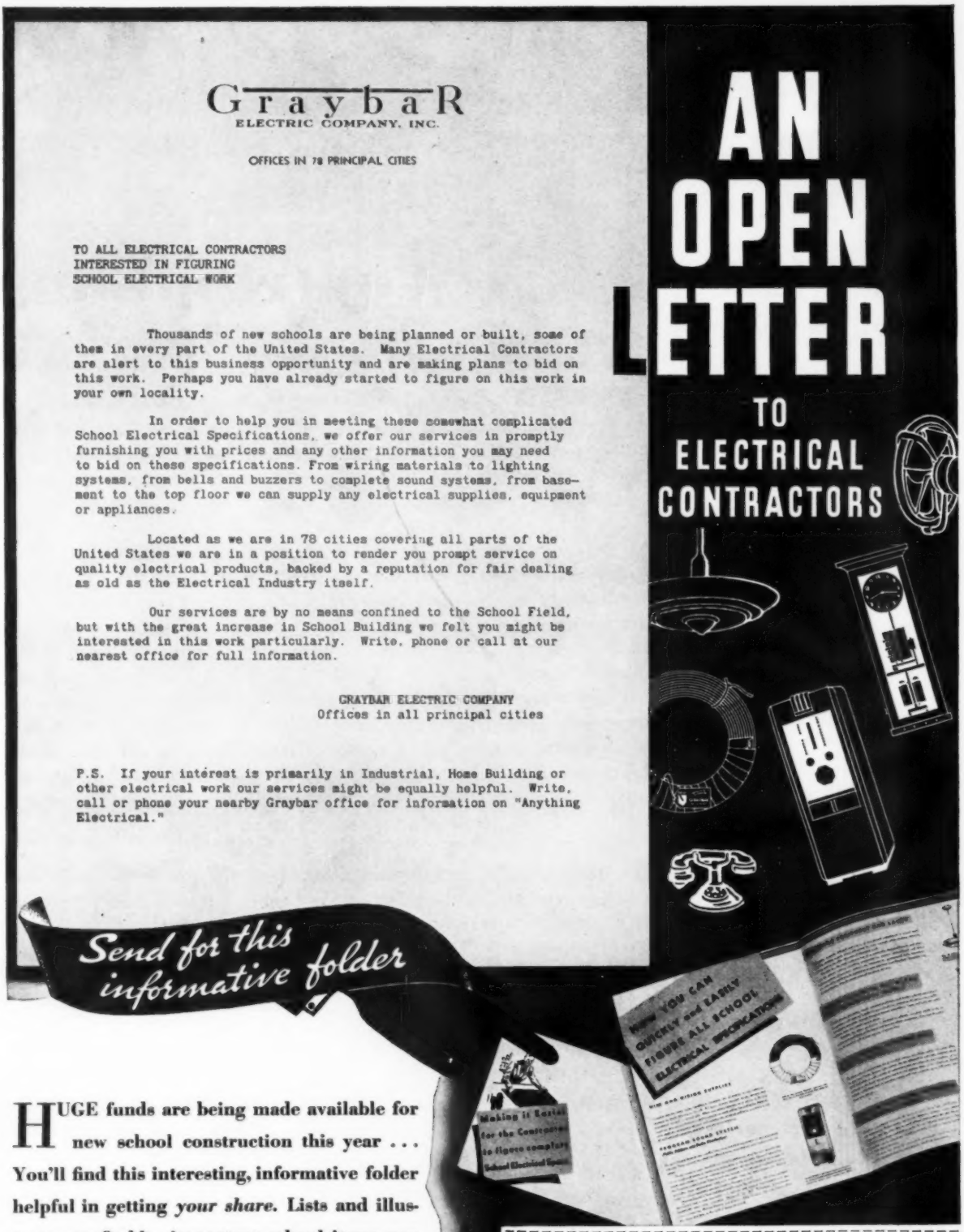
Offices in all principal cities

P.S. If your interest is primarily in Industrial, Home Building or other electrical work our services might be equally helpful. Write, call or phone your nearby Graybar office for information on "Anything Electrical."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ELECTRICAL CONTRACTING

Vol. 35 MAY, 1936 No. 7

▲

S. B. Williams, Editor

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FIELD BRIEFS

● THERE IS ONE electrical contractor to every four general contractors in California and one electrical to every five of all other types of sub-contractors.

● APPROXIMATELY five million people inspected 315 G-E New American demonstration homes built in all parts of the country last year.

● ONLY ONE FARM in nine in the United States has central station service, according to REA, as compared with almost complete rural electrification in Holland, ninety per cent in Germany, fifty per cent in Sweden and fifteen per cent in Ontario.

● WHAT PRICE FLOOD repairs? First guesses by R. C. Carmack, secretary-manager of the Electrical Contractors Association of Pittsburgh (Pa.) were that his 36 members would do about 90 per cent of such work in the Pittsburgh area at a probable total figure of around $750,000. But with some building owners already estimating that the cost to repair their electrical damages will run $125,000 for one structure, the final cost for repairing several thousand electrical systems may far exceed that first guess.

● UNCLE SAM'S navy played an unusual rôle during Hartford's recovery from its flood disaster. Blue jacket electricians from the New London, Conn., submarine base were sent up to Chief Electrical Inspector Rohan, to help out with emergency inspections.

● NINETY PER CENT of the class rooms of the schools of the country are improperly lighted according to Professor Rowell of Columbia University Teachers' College. To improve the lighting in New York schools experimental lighting will be tried out in six of the city's public schools.

● THREE TIMES as much light for the same amount of energy is possible by means of a mercury arc lamp demonstrated by Dr. John W. Marden of the Westinghouse Lamp Company recently before the I.E.S. This "midget sun" as it is called has an efficiency of 65 lumens per watt and a light almost identical to sunlight. It is stated that the temperatures developed in these arcs are the highest known to man.

● FLOOD-STRICKEN small business men and home owners of the Hartford, Conn., area are being aided in the reestablishment of shops and homes through emergency appropriations, and with character loans up to $1,000 at 3 per cent interest. The Hartford Electric Light Company announced that it will give financial aid to customers in need of emergency wiring or appliance repairs. The company proposed to arrange installment payments for work done. Customers were asked to bring in estimates from electrical contractors to cover the work for which installment arrangements were to be made.

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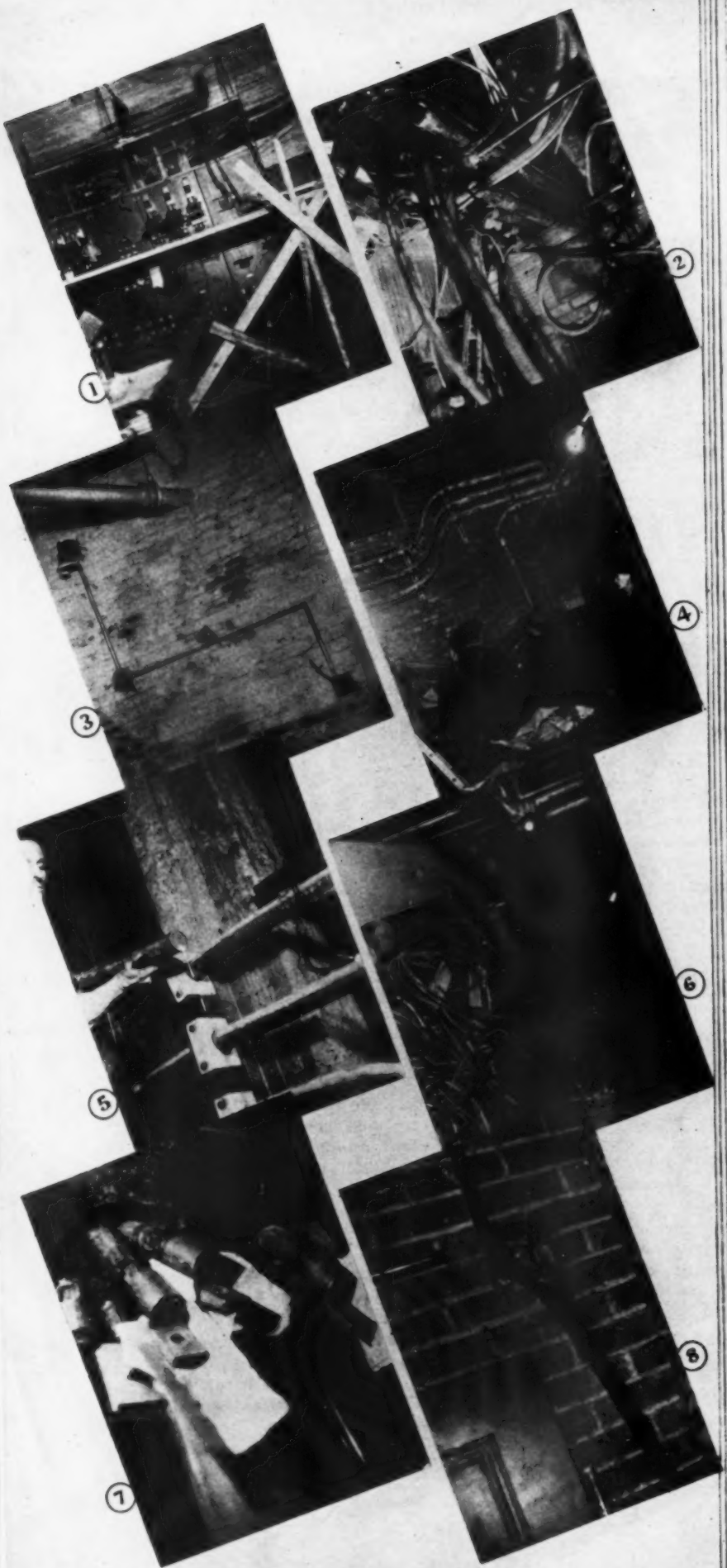

MOISTURE is looked upon in the National Electrical Code as hazardous to wiring and for that reason extra precautions are decreed whenever an excess amount is present. What then did the recent floods do to wiring and wiring materials? How badly has insulation and equipment been damaged? What portion may be salvaged? And how long will old materials hold up under normal future use after reconditioning?

To get a picture of actual conditions as accurately as possible, a field study was made in Hartford, Conn., and Pittsburgh, Pa., by a staff member of ELECTRICAL CONTRACTING.

Raceway Systems

In general wires and cables were removed from all raceways which extended below the high water mark. Exceptions were made where vertical runs were submerged for only a few feet, and which became drained out as soon as the water receded. This exception did not generally apply to basement areas in which the water stood for days. For that reason most service entrance conductors that terminated at basement meter locations had to be replaced.

Many runs of feeder cable and smaller wires were found to have become so swollen in their raceways that it was difficult to remove them, and when they were removed, were too mutilated to be used again. On the other hand installations with generous raceway sizes, and without unnecessary elbows were easily cleared of water-filled conductors.

Surface metal raceways were found to present little difficulty be-

1. Large switchboards comprising open switches and busbars continued to function for many hours while submerged in icy flood waters. This board, about 53 ft. below the crest, became flooded at midnight and carried current to a large theatre and office building until 7:30 in the morning.

2. Water-soaked cables had to be removed from feeder conduits that terminated in crowded riser and metering shafts.

3. Surface metal raceways were easily drained and swabbed.

4. Even lead-sheathed feeder cables, racked along the walls in customer transformer stations, were found damaged beyond repair.

5. Flood waters had syphoned along these 2,000,000 c.m. rubber-covered lead-sheathed

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FLOODED WIRING

cause they quickly drained. Where conductors had become swollen in the runs it was not difficult to take off cappings to remove the wires.

Condition of Insulation

An analysis of how the flood waters damaged conductor insulation involves a wide variance of conditions and also of opinions. The age of insulation; probable current loading; proximity in past years to excessive temperatures, such as steam pipes; abuse or abrasion when originally drawn into raceways; and possible flaws in the original braid —all were factors that had to be considered. The presence of industrial chemicals in flood waters also presented unknown deterioration problems. Wires that lay in horizontal runs or pockets for a week or more were found in some cases to have swollen to a third larger than normal diameter, while vertical runs usually drained out quickly.

Because of the confusion in the flooded areas, detailed investigations by inspectors of each building's conductor insulation were out of question. The contractors were therefore instructed to observe a general ruling of wire replacement as already mentioned. As a result a staggering footage of old wire and cable has been removed.

One large building had junction boxes cut into its conduits in the riser shaft at a point above flood level. The upper portions of all old feeders were retained, while new sections were pulled in from these junction boxes to the main switchboards.

One Pittsburgh contractor reports pulling out 6,000 ft. of saturated 500,000 c.m. 600-V. varnished cable feeders, which had been "bleeding" water for days, and no estimate was ventured as to how long it would have continued.

Cables with lug terminals located below the water line seemed to have become saturated throughout the entire length of submersion, while those cables to which no lugs were attached below flood level, and which had no serious abrasion, were found in many cases to have resisted moisture. Despite reasonably good taping at the ends of lugs, water appeared to have entered the cable ends, and to have circulated along the copper strands, beneath the insulation wall. Varnished cable insulation was found to "syphon" water to a marked degree.

That tests do not reveal all of the existing conditions were clearly shown with some saturated 500,000 c.m. lead-sheathed feeder cable which gave a fairly clear test after the lead sheath was stripped off for 2 ft. at each end. This cable was then laid on the ground and connected up as a temporary motor feeder. It blew up under a 200-amp., 220-V. load.

Herman H. Sticht & Company, of New York, N. Y., supplied a staff member with a 500-volt megohmmeter with which a series of tests on various types, sizes and lengths of water-soaked conductors were made in the Pittsburgh area.

Feeder and service entrance conductors that ranged in size from No. 8 to 2,000,000 c.m., and having 600-volt and 1,000-volt rubber and varnished cambric insulation were tested while entirely disconnected from damp equipment. Accurate readings as low as 240 ohms, and as high as 100 megohms were obtained, thus indicating a wide variation in the condition of water-soaked conductors. For comparison, new 600-volt conductors are required to have an insulation value of 1,500 megohms per 1,000 ft. of No. 14 wire, to 250 megohms per 1,000 ft. of 2,000,000 c.m. cable. A fair minimum insulation resistance value for old feeder cables is considered to be about 5 megohms on runs between 100 to 300 ft. in length.

Branch circuit No. 14 and No. 12 wires that had not yet been pulled out of flooded raceways tested from 15,000 ohms to 2½ megohms. Dry flexible cords tested over 200 megohms, while several water-soaked parallel cords, complete with sockets and plugs, tested from 150 ohms up to 2,000 ohms. Wet cords, after removing sockets, attachment plugs and 6 in. of cord at both ends tested from 2 to 100 megohms.

Armored Cable

A general order requiring submerged armored cable to be abandoned was issued by the electrical inspection departments of both Hartford and Pittsburgh. Because of the large areas affected by flood waters, this action was deemed necessary not only to prevent the possibility of wet wiring systems causing fires, or injuries from electrical shocks; but also because attempts to single out by tests those parts of flooded systems which were safe to operate would have held up restoration of service for too long a period. Various responsible electrical contractors concurred in this general requirement.

Insulation resistance tests of armored cable that had been under water were made in Pittsburgh, Pa., by a staff member 18 days after the flood had receded. These tests were made in ten homes and stores under three conditions: (a) Armored cable concealed in water-soaked masonry or partitions. Readings ranged from 250 ohms to 250,000 ohms with all wiring devices and fuse cutout terminations disconnected. (b) Exposed armored cable in place on basement ceilings, ends of conductors disconnected. Readings from 2 megohms

600-V cables. When the cables were sawed off, streams of water poured out from within the assembly.

6. A group of 750,000 c.m. multiple feeders that lay in a 200 ft. long horizontal run of conduits drained water upon the switchboard buses for two weeks after all water had been pumped from the basement of this building.

7. A 120-ft. run of concealed 1-in. conduit which contains five No. 8's may need to be abandoned. Swelled conductors became so securely wedged in at one of four elbows, that blocks and tackle were of no avail. Four men had worked a full day in this futile effort.

8. Staggering footages of old watersoaked conductors were replaced with new material.

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to 150 megohms. (c) Partially dry armored cable in odd lengths that were found at several buildings which had already been re-wired with new material. Lengths ranged from 10 ft. to 35 ft. Some was new material which had never been energized, while other pieces were said to be 15 to 20 years old. Readings ranged from 75 megohms up to 250 megohms.

The wide variance of insulation resistance readings that were obtained during such a limited test leaves the safety of re-energizing water-soaked armored cable a matter to be determined only after exhaustive investigation.

Swabbing and Drying Raceways

The procedure for raceway wiring systems involved: (a) Pulling out water-soaked conductors; (b) removing water and silt from empty raceways; (c) pulling in new or salvaged conductors; (d) cleaning out silt, and draining all raceways containing large feeders which were not to be pulled out.

A set of flooded 1,000,000 c.m. feeders were left in the raceway in a New England industrial plant. These feeders were flushed under high water pressure to remove silt. The circulation of warm air through the flushed raceway was said to have made it sufficiently dry to indicate a satisfactory insulation resistance reading twelve hours later. Several partially submerged service raceways containing the original No. 8 wires were tested which indicated reasonably good insulation resistances.

Because of swollen insulation, crowded raceways or insulation that had become sticky, the removal of old water-soaked conductors was in many instances very costly. Block and tackle, improvised timbers for prying, and other methods were employed with caution. Frequent instances of jammed and broken off wires were reported. Here and there some conductors could not be removed. Some hasty experiments with liquid soap that was shot into raceways by means of an air gun were said to have provided lubrication for stubborn old wires.

Swabbing of empty raceways was most successful with cotton underwear scraps. Usually six to eight swipes removed the water, and from four to six successive swipes absorbed the remaining moisture. Attempts to speed up the swabbing operations by using too much cloth usually resulted in losing rags in the raceway.

Air pressure methods for blowing out water were not tried in many cases, because of the existing confusion. Some attempts were made to circulate pre-heated air through swabbed conduits, but in general such efforts were abandoned as being impractical.

The average 30 to 50-ft. run of ½-in. and ¾-in. required 1½ to 3 hours per run for a 3-man crew to remove the wire and to swab the raceway.

Because of the varied conditions that interfered with pulling out feeders at switch boards and panelboard centers, such as temporary cables, live busses, and temporary switches, no fair average time can be given. Some important concealed runs of water-soaked wire as small as No. 8's were reported to have required a full day for three and four men to remove them. Large feeder cable removal jobs took from two to five hours for crews averaging from four to six men, after equipment was set up.

The lack of wiring plans for the more complex jobs increased the cost for removing old wire considerably.

Installing New Wire

Old swabbed-out conduit presented more difficulty to wire pulling than new conduit. Because of acid conditions of flood waters, interior corrosion, and rust within the submerged lengths, it was generally necessary to resort to lubricants. Soap stone was not found as satisfactory on flood work as for pulling wire on new jobs. Soap flakes of low alkaline content, dissolved into a creamy mass, were used extensively. Several contractors reported splendid results with a specially-prepared wire-pulling white paste that can be applied by handfuls as the wires are being pulled in.

Despite extreme care, it was necessary in nearly all cases to re-swab all conduits repeatedly because of leakage from adjacent conduits as they were being emptied and because corks would become loose or knocked off at crowded panelboards. It was not feasible to pull new wire until all raceways of a group were thoroughly dried. Some cases of backseepage within the water-soaked floors also required additional swabbing operations.

Acid Damage

From the heavy corrosion that appeared on the various water-soaked device mechanisms employing ferrous metals, it was judged by contractors and workmen of both Hartford and Pittsburgh that the flood waters were heavily laden with industrial chemicals. As an example, five carboys of sulphuric acid became submerged and released in a Hartford basement. Wiremen of both cities who had cut or bruised their hands, complained of the stinging effects that were felt when working in stagnant flood water.

A switchboard manufacturer who did a large amount of equipment reconditioning, reports cadmium and zinc plating on mechanical parts as having resisted corrosion quite well, but that the copper plating on steel parts was quite generally consumed.

Because the acidity was of unknown strength, many contractors and inspectors were concerned about its ultimate deteriorating effect upon conductor insulation and water-soaked composition materials.

Wiring Devices

Water-soaked sockets, receptacles, toggle or snap switches, because of corroded mechanical parts, the presence of silt, and the swelling of certain fibre insulation and linings were abandoned. One contractor in Hartford who permitted some water-soaked drop cords to be connected to a temporary line reported that the cord began smoking and steaming after operating for two hours. The insulation broke down in the socket or where the cord entered the pendant cap. Fixture wire was also replaced.

Fuse Cutouts

Plug fuse cutouts were rarely salvaged, because of their low replacement cost. The thin fibre washer that is provided in most types to insulate the center contact from the screw shell was found to be considerably warped and swollen. Larger cartridge fuse cutouts were salvaged in many cases by cleaning and drying.

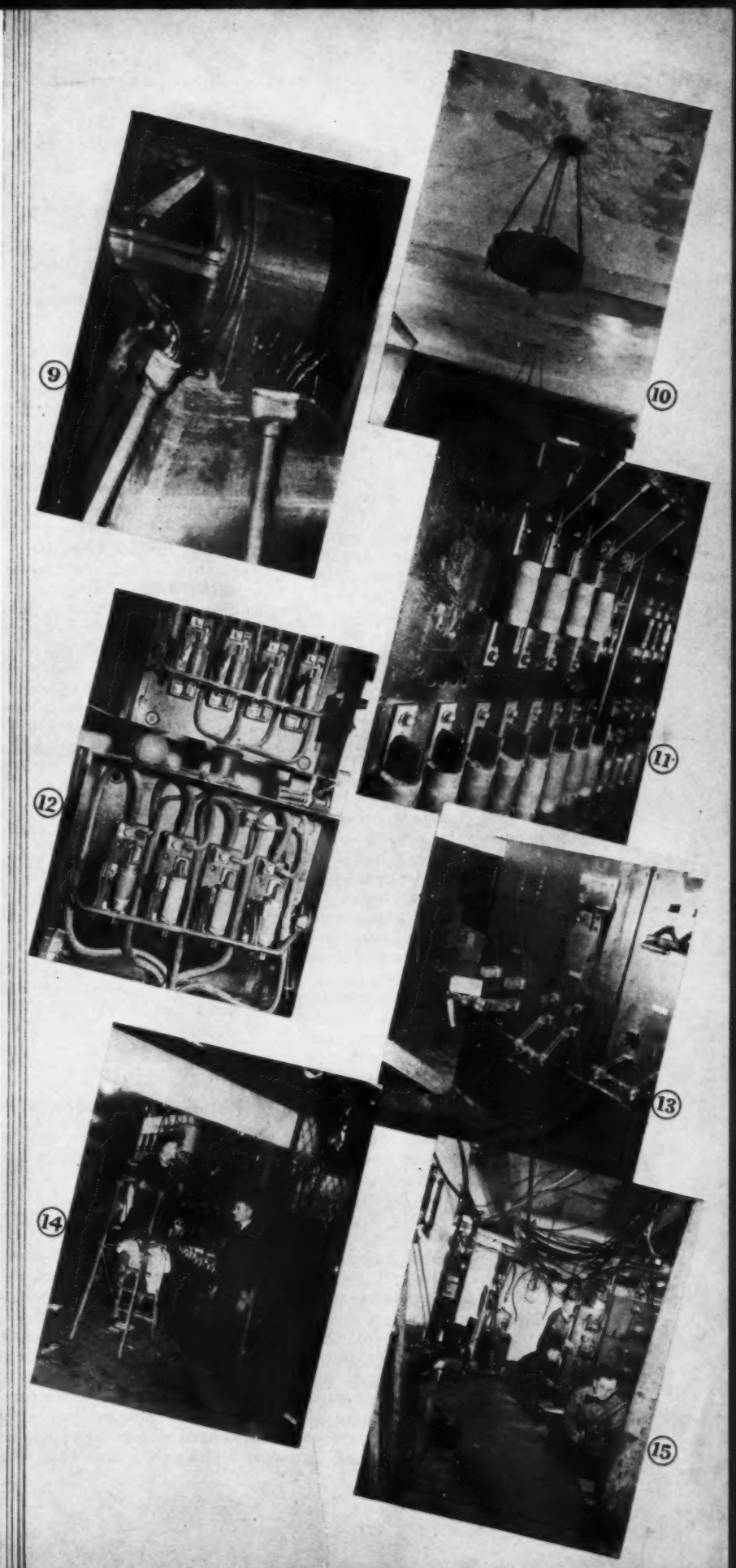
Fuses

Because of considerable swelling in fibre casings, and the water soaked condition of powder-packed cartridge fuses, the non-renewable types were quite generally discarded.

Many plug fuses were also thrown out, particularly those made with porous porcelain bases. Of the various types of renewable cartridge fuses, many fibre cases were found to have become sufficiently distorted to throw their contact blades badly out of alignment. Renewable type fuses that were not seriously swollen were taken apart, dried and cleaned, and placed back in service.

Knife Switches and Cabinets

Considerable difficulty was experienced with the water-soaked fibre parts of externally operated switches. Cross bars of multi-blade switches were so badly swollen that the blades were so tightly jammed against switch jaws as to render the switch inoperative. Many switches which happened to be open before becoming submerged could not be closed. In one Hartford residential district over thirty meter service switches could not be opened because of the fibre swelling condition. Emergency cut-off crews reported pulling entire meter boards from the wall in trying to operate service switches. Some types of externally operated



9. Lead sheathed cables to 250 hp., 2,200-volt motors in a Hartford plant were ruined because no potheads were provided at the motor terminals.

10. Lighting fixtures had to be cleaned, refinished, rewired and resocketed. Many fixtures like these in the Hartford Gas Company's cooking school were replaced with modern units.

11. Fibre cases of old one-time cartridge type fuses became badly swollen. The top row are 225-amp., and the lower row 600-amp. Period under water about 8 days.

12. Fibre parts in large safety switches became swollen, flabby, and out of shape when under water for several days. Top 100-amp., bottom 200-amp., 4-pole, 250-V., fusible externally operated switches.

13. How 2-in. thick black marine finished slate panels cracked up when icy flood waters poured in on live buses and switch parts.

14. A large marble switchboard that operated under water from midnight until 8 the following morning. There are 24—500-volt d.c. air circuit breakers in the foreground. This board was reconditioned piece-by-piece although a temporary 500-volt panelboard was hung in front. The marble did not crack, and it tested clear of grounds without being baked out.

15. Those buildings which have elevator controls in flood-able basements must risk long interruptions to service. Scene in a Hartford basement room containing four passenger elevator motors and controllers.

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switches that employed sheet fibre lever hooks became so softened and flabby that the lever bars slipped over the fibre hooks when an attempt was made to open a switch.

In restoring service, the larger sizes of switches were taken apart, thoroughly dried, and cleaned. Cabinets of various sizes were repainted with quick-drying enamels, varnishes and other protective coatings. Many new switch mechanisms are being installed in the original enclosures.

Switchboards and Panelboards

Much of the distribution equipment that met with flood damage, became submerged in icy water while operating under full loads. The effects upon such equipment mainly involved corrosion of parts and the lowering of insulation values. Cheap grades of slate seemed to fare worst. Marble switchboards appeared to stand up well. Several carrying the load for large buildings for 12 hours or more, although under 20 ft. or more of flood water. These were readily cleaned up and are again in operation.

Tests made on submerged equipment, between live parts mounted on moulded bases, and their steel supports, gave readings of from 25,000 ohms up to 100,000 ohms. Slate switchboards that had been submerged five days or more, but which had been out of water for several weeks showed insulation resistances between their busses and the metal frames that ranged from 5,000 ohms upward.

Slate switchboard panels were reported to have absorbed varying amounts of moisture. Normal insulation values were not restored until the panels were thoroughly baked dry. One reconditioning plant experienced numerous cases where the slabs or panels flaked or peeled apart as they began to dry out.

A large live-face slate switchboard that operated for eight hours at full load under about 50 ft. of water, was found to have developed cracks that extended over the full height of its 2-in. thick panels. It is presumed that sudden contraction of heavily-loaded bare bus bars located on the rear of this switchboard, when suddenly submerged in icy water, produced a sufficiently heavy distortion or strain on switch studs to break the panels in this manner.

The stage control switchboard in a large Pittsburgh theatre and its rows of remote-controlled contactors below stage were totally under water. Composition supporting panels for this intricate equipment tested from 25,000 to 100,000 ohms resistance to the steel supporting framework before being dried out.

Miscellaneous Reconditioning Operations

From switchboards and panelboards through the wide variety of current interrupting devices that were subjected to flood water, the majority of equipment needed to be given a thorough hosing down and brushing to remove dirt, dried out, and then treated to arrest corrosion. A light film of fine grade oil was wiped on the cleaned surfaces to protect against further corrosion.

Large panels and switchboards were mainly dried off in bake ovens at service shops, but in some cases drying out was done at the job. Job drying ranged from special steam or electrically heated enclosures built around the equipment to ordinary atmospheric drying while in place. The latter method was slow and more or less unsatisfactory.

Some customers authorized the renewal of all small parts in sectional panelboards, such as tumbler switches and fuse sections.

Oil-filled equipment, such as transformers, oil circuit breakers, and autostarters were found to have lost most of their oil, because as flood waters entered the cases, the oil was floated out. Such devices were given a thorough cleaning, their windings dried and re-varnished, contacts cleaned or renewed, and then the reservoirs filled with fresh oil before being placed in service.

Motors and Generators

Flood damaged motors and generators were quite generally reconditioned as follows: (1) Thorough hosing down with water; (2) Greasy surfaces washed clean with kerosene or other solvents; (3) Baked at temperatures varying from 180 deg. to 235 deg. F.; (4) Intermittent megohm readings taken to ascertain when normal insulation values had been restored; and (5) Windings revarnished with air-drying material, or with high-temperature varnish.

Because the demand for temporary motors could not be met, many water-soaked motors were placed in service with only a superficial reconditioning. One well-known New England motor expert predicts a heavy secondary wave of motor repair work because of partially dried and improperly varnished motors being rushed back in service. Several instances of motor failures were on record soon after the flood had receded.

Conclusion

Flood damage replacement work is running into staggering sums, when the cost of over-time temporary work is included. The manager of a commercial building at Pittsburgh estimated their electrical job will exceed $125,000. A hotel at Hartford may have a bill of over $20,000.

Much of this loss could have been avoided. Future installations in structures that are likely to become submerged can be planned to cut down reconditioning costs and long interruptions to service on upper floors. (1) Valuable switchboards, main feeder networks, other vital control centers, and terminal cabinets, should be located above the record high-water level; (2) Feeders and branch circuits should be routed to minimize water traps; (3) Raceways should be considerably oversize in all areas that are subject to submersion, to assure the easy removal of water-soaked conductors; (4) Important feeders should be effectively sealed at terminals to exclude moisture; (5) Cabinets and junction boxes should be located in spaces that are accessible for two and three men to work, to facilitate removing wire and swabbing conduits.

The flood has revealed much dangerous bootleg and amateur wiring in homes. That type of work will gradually be removed, because final inspections will be made before service is permanently restored.

In the flooded commercial and industrial districts, electrical contractors and inspectors alike are uncovering glaring examples of makeshift maintenance and alteration work. Contractors report having removed conductors for which spliced joints had been pulled into raceways. Improper over-current protection, badly burned starter contacts, damaged grounding connections, loosened fittings, and countless other defects will thus become remedied. Many owners that have put off the replacement of obsolete equipment are now ordering extensive replacements.

Ten Approaches to the Sale of Adequate Wiring in Residences

By S. B. Williams
Editor, ELECTRICAL CONTRACTING

THE problem of selling house wiring has been discussed at length for a great many years, the consensus being that wiring per se could not be sold because it was hidden behind walls.

Survey after survey, however, has shown that the public is not particularly interested in wiring as such. In what, then, is the public interested that wiring will accomplish? Are there any problems in connection with living that are solved only through better wiring?

In the belief that the sale of adequate wiring in the home is largely a matter of understanding the customer's needs and requirements, we are presenting here ten approaches to this market. These are not offered as completely covering the sales approach, but merely as being indicative of the type of sales thinking that is necessary if the prospect is to be sold a larger bill of wiring. Nor is it necessary to use all ten approaches in every sale.

These approaches also will serve *as a basic theme* for advertising appeals and in that way can be used to create the desire for wiring.

1. Easier Housekeeping. Electricity has already lightened the housekeeper's burden through the substitution of the washing machine for the old wash board, of the vacuum cleaner for the broom, of the incandescent lamp for the smelly to-be-filled-daily kerosene lamp, etc. These are fundamentals. There are still numerous other ways in which the housewives' task can be made simpler and easier.

Sell a light over the range to reduce the number of cooking mistakes, and a light over the sink to speed up dish washing.

Rooms can be rearranged at will when the portable lighting is not fixed by a certain few wall locations.

The noise and muss of children's play can be kept out of the living room when sufficient light is provided elsewhere.

With the living room outlets on a hot and switched circuit, the individual portable lamps will not have to be turned out on cleaning day and then later individually turned on.

A centrally located outlet will make cleaning days simpler by making it unnecessary to detach the cleaner cord for every room.

2. Step Savers. Now that the real drudgery of housekeeping has disappeared, the hardest task around a home is the constant running up and down stairs, in and out of rooms, answering phone calls and door bells. Housewives are looking for ways to save steps.

The nuisance of a sick room can be greatly reduced if the patient has some way of communicating with the rest of the family when he wants something without making it necessary for somebody to run up to his room every so often to check up on his wants. An annunciator button would do the trick nicely. A housewife is up stairs and she wants the maid. Again an annunciator will save her steps.

A switch at the telephone can turn off a noisy radio and thereby save steps.

An upstairs telephone will save a powerful lot of running up and down stairs.

3. Current Saving. There are many ways in which the average person wastes electricity and thereby increases his light bill. These wastes run on, month in and month out. Little pilot lights, or bullseyes, will call attention to the fact that the current has been left on an electric iron, or that a bulb is burning in the cellar or in the attic.

Wall switches at each door will make it possible without any particular effort to turn off the light every time a room is left empty.

Small inexpensive time switches on closet lights, percolators and other devices can take the place of memory and prevent waste.

Small circuit wires heat up as they are loaded and this waste in heat is on the light bill. This condition also reduces the voltage with the result that the amount of light is greatly reduced so that the customer gets less light and pays more for it.

Reduced voltage also causes heating devices to take longer time and give poorer culinary results.

4. Accident Prevention. Electricity is probably the most dangerous force known to man. It can, however, be the safest force known when properly installed and maintained. In addition, electricity can prevent numerous accidents in the home. Insurance statistics show that more personal accidents happen in the home than elsewhere.

Switches at every door by providing a path of light in front of one can prevent large numbers of accidents due to stumbling over unseen objects in the dark, or barking one's shins, or falling down stairs, or tripping on rugs, etc.

In damp places such as cellars and bath rooms, non-metallic sock-

ets can prevent many fatal accidents.

Small transformers with electric toys frequently get very hot and sometimes burn and shock children. A wall outlet in the toy room wired to a transformer of adequate capacity will prevent this.

Fires in clothes closets due to searching with a lighted match do not happen when closets have electric lights.

One need not stumble into holes, or over trunks, or bump one's head in the attic if there is a light there with a wall switch.

Cellar stairs have a habit of being poorly constructed and rather dangerous, particularly to one who is not entirely familiar with them. A light will prevent many bad falls at such places.

All stairs that are not properly lighted are a potential source of accidents, and especially so where there are children or elderly people in the house.

5. Fear and Worry Prevention. Night time brings fears and worries. Much of this can be alleviated through the provision of light at the proper place at the proper time.

A great many women are left alone a large part of the time because their husbands travel. Noises in the night are extremely alarming. Some times these noises are definitely known such as a banging shutter, but the dread of going to it through the dark is stronger than the noise. A master switch which would throw on one or more lights in all the principal rooms would definitely solve this problem.

Outdoor lights will keep away prowlers.

A switch in the bedroom at the bedside connected to a light in the chicken yard will quickly scare away thieves. Likewise, a similar connection for a light in the garage will deter anyone from molesting the car.

There are certain fears when one comes home late at night, first that of being blackjacked while fumbling with the key at the key hole, and second the fear of going into a dark house. A momentary contact switch takes care of the former while a key switch at the front door can be used to turn on a few inside lights before entering the house.

6. Happier Guests. Hospitality is one of the first considerations of a home. Adequate wiring can provide certain things that will increase the comfort of guests.

Most houses are hard to find at night. Guests will have an easier time and not be required to disturb neighbors if there is an electrically lighted house number.

Entrance door lights are more inviting to guests.

Guests rooms provided with night reading lights, maid call, dressing table lights, will greatly add to the comfort of guests.

Sufficient light for all of the card players in the game or living room will make a more comfortable game.

7. Lessened Fire Hazard. Electrical fires in homes come mostly from flatirons, over fusing, cords, and handy-man wiring. Adequate wiring will eliminate these causes of fires.

A bullseye or pilot at the iron outlet will show that the iron is on.

A sufficient number of circuits of the right size will eliminate any need for over-fusing. In fact it will eliminate the blowing of fuses except for defective fixtures and equipment.

Provision of a sufficient number of plug receptacles in logical locations will eliminate much of the need for later additions, and even when needed they can be put in at little cost if the circuiting is adequate to begin with.

8. Increased Prestige. Every hostess likes to do things a little differently, a little better perhaps. She likes to have things run smoothly and she likes to be able to show off her home to the best advantage.

Chimes instead of bells at the front door, soft sounding servant calls instead of a harsh buzzer, will be noticed by other women.

Spots of light, perhaps cove lighting, picture lighting, all tend to lend an air of distinction to the home.

9. Reduced Domestic Friction. Most of the family rows come from small annoyances, many of which adequate wiring can prevent at the source.

A night light in the baby's room will permit crib attention without waking the baby up.

A ventilating fan will keep kitchen odors out of the rest of the house and incidentally by providing a cooler kitchen, will keep the housewife's temper under better control.

A bath room heater will take away a cause for one of the common pre-breakfast arguments.

Bedroom radio outlets will permit the children to enjoy their evening radio programs without disturbing the grown-ups.

10. Lower Upkeep Cost. Low cost inadequate wiring is never satisfactory because it does not provide outlets where they are wanted and it is not large enough to take care of large appliances when needed.

With inadequate wiring the owner either does without appliances or good lighting, or else he puts in additional outlets. To put them in later costs much more than at the time the house is built. If the owner tries to get along without more wiring, he finds he is constantly blowing fuses, and still not getting good service.

If he tries to correct things himself, he is apt to create a dangerous fire hazard. If he calls in an electrician, there is a charge.

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Speedy Apartment Hotel Wiring

with Vertical Circuits

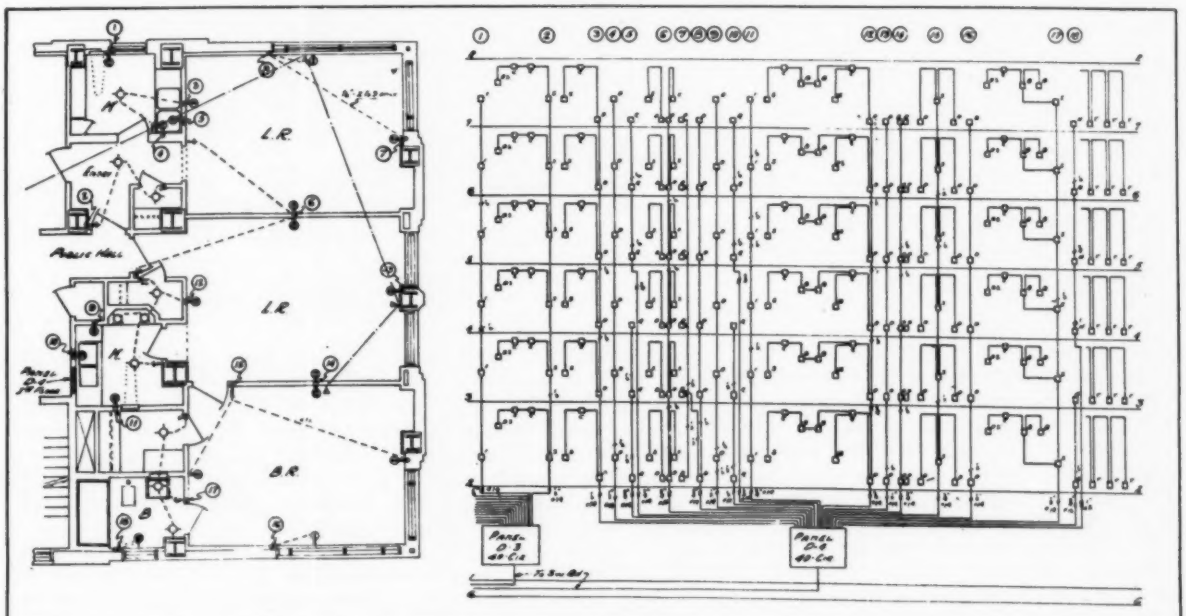
The Tower Apartment, Miami Beach, Fla.

TO make possible the speedy wiring of a rush apartment hotel project at Miami Beach, the Ingalls Electric Company of Miami, Fla., prepared a wiring layout employing riser or vertical circuits to the various outlets occurring in the six apartment floors. Because this method permitted the branch circuit risers being installed as the steel work was erected, and left very few horizontal runs to be installed on the concrete forms, the general contractor was able to proceed more rapidly with pouring his various floors.

Here is a seven-story fireproof steel-frame structure with 60 apartments and elaborate first floor shops, in which a $60,000 electrical job was commenced on Nov. 18 and completed Jan. 17; or in slightly less than 9 weeks. The electrical layout for this project, which was prepared by engineers of the Ingalls Electric Company, was not begun until October 27.

The riser system was distributed from 40-circuit panelboards located on the first floor, thus eliminating all feeder work on the upper levels. As a result the main service and feeder work was being completed as the work progressed on upper floors. Because there were no feeders or panelboards involved on the upper floors, it was possible to move up from floor to floor and coordinate the completion of the electrical work with other crafts.

A considerable time-saving factor which affected the floor-pouring stages of construction was the elimination of bending and threading odd pieces of horizontal conduit. With the riser circuiting method it was possible to prepare in advance of each floor for the number of straight pipes that would be stubbed up to definite switch, receptacle and bracket outlet heights on the floor



(Left) Portion of typical 10-apartment floor plan showing two apartments. Numbers at outlets correspond with riser numbers on vertical circuit or riser plan.

(Right) A partial riser plan covering the numbering scheme for those vertical circuits that supply the two typical suites appearing on the accompanying plan.

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above. The usual maze of home-runs to panelboards, and the usual number of inter-connecting conduits between outlets and switches were practically eliminated.

Although a liberal number of outlets was provided for the suites, all living rooms having no less than four duplex receptacles, it was possible to spot them for maximum guest convenience and yet keep them in typical positions above each other on all floors. This made possible a layout of risers to feed various typical outlets in "stacks." A few bracket outlets which occurred in hung ceiling areas were piped after the floors were poured, from typical riser-connected switch locations. Likewise, the connections for door switches, of which there were two or more per suite, were looped down into the door buck from a nearby hung-ceiling outlet. The rigid conduit was terminated near the door switch case, and from this point a short piece of flexible steel conduit was used to complete the connection.

Riser Plan

To clarify the layout and thus prevent confusion during the hurried installation of this work, a detailed branch circuit riser plan was developed. Each riser was numbered on the riser plan. This number was also indicated at the corresponding outlet or group of outlets appearing on the typical floor plan as part of a vertical run.

Several limiting features result from this method of circuiting. First of all, it is not adaptable to suite metering, but can only be employed where all apartments are on one meter. Furthermore, such a system is not advisable for a structure wherein the interior partitions may be changed from time to time. Because all floors on the system depend entirely upon risers that pass through the various walls, any partition change would affect conduits containing wires supplying upper floors. Since certain outlets from the first apartment level to the top floor are in some cases connected to one branch circuit, any outages due to defective appliances or other causes would disrupt that typical outlet in all apartments supplied by that vertical branch circuit. With some riser circuits necessitating a total length of over 100 ft., it will require caution in providing adequate copper for outlets to heaters, irons, etc.

SMALL COIL PRODUCTION

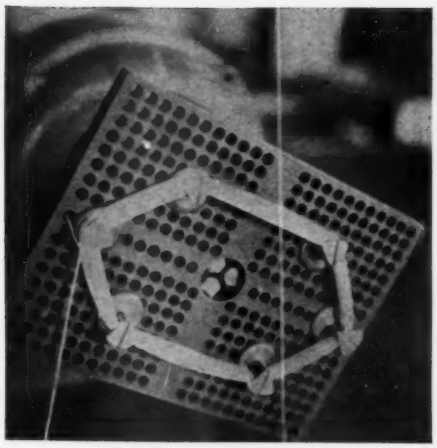
by Template Method

Stator coils for small a.c. motors are quickly wound to accurate dimensions on this direct-drive, variable-speed, dynamic brake, winder. Foot lever control leaves the operator free to use both hands in the winding operation.

AN adjustable coil winding head which can be set up quickly to duplicate templets already recorded on data cards is giving accurately shaped small coil production at low labor cost for the Cleveland Electric Company of Atlanta, Ga.

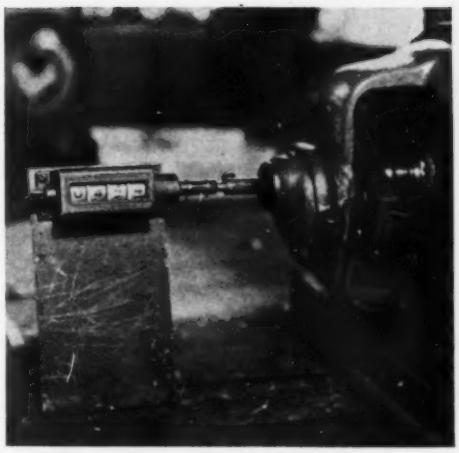
To provide an efficient production unit for its system of operations, this company developed a foot-controlled, variable speed, direct driven, winding outfit that turns out uniform coils quickly. Make-ready time for varied coil shapes is said to be materially lessened, and the accurately shaped coils that are produced is said to be reflected in further economies in placing completed coils in the stator.

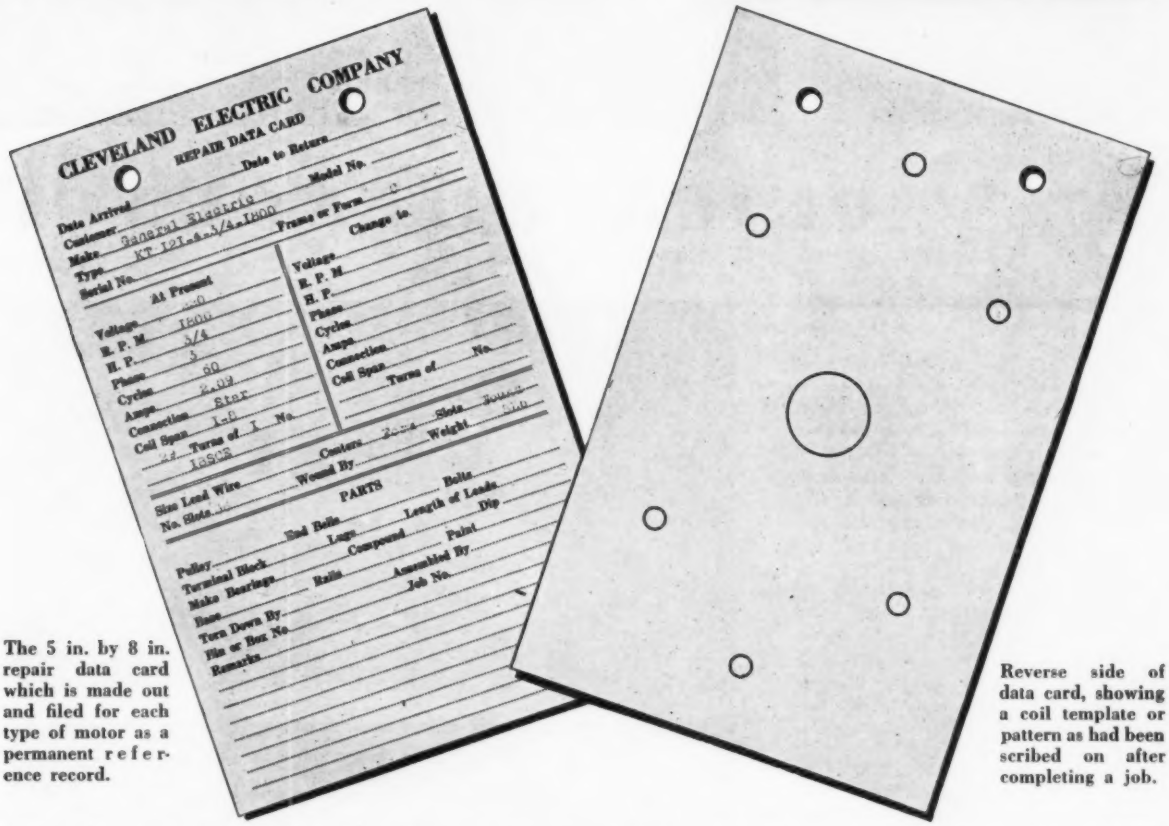
A perforated flat steel plate, which is used for holding the coil forming pins, is laid upon the reverse side of winding data cards for setting up the correct pin positions to correspond with template records of previously wound mo-



The flat-plate head, with its 372 holes permits setting up for small coils of almost any shape. The flanged pins have slip-fit stems that are drilled and tapped at the back for rear-of-plate fastening screws. A half-turn of any two pins permits the wound coil being removed, after it has been tied in several places.

The driving motor has both ends of its shaft extended. The quick-reset turn-counting unit is direct-coupled, and fastened to the bench by a flat steel bracket.





The 5 in. by 8 in. repair data card which is made out and filed for each type of motor as a permanent reference record.

Reverse side of data card, showing a coil template or pattern as had been scribed on after completing a job.

tors of identical design. A similar procedure is followed to make template records on new data cards for motors of a type for which no coil-shape templates are on file.

In this departure from more or less conventional shop procedure, the winding equipment was specially designed. First, the 6-in. by 8-in. by ½-in. flat winding head was drilled to provide three hundred and seventy-two ¼-in. holes for setting up almost any desired arrangement of coil forming pins. The pins were designed for easy removal, and are easily turned for taking off a complete coil. The pins are secured to the plate from the opposite side by machine screws. These screws may be removed without removing the pins, and the plate then placed upon a template card. The position of each pin-hole may then be scribed upon the card as each pin is lifted.

Motor Drive

The motor drive consists of a ½-hp., 1150 r.p.m. 230-V. d.c. compound motor, operating from a 1-kw. 55-V. motor-generator set. A variation in motor speed of from 300 to 900 r.p.m. is obtained by field resistors, controlled from a radial-contact foot lever switch. Dynamic braking is secured automatically by armature short-circuiting contacts on the foot lever switch. With this smooth-starting and quick-stopping direct drive, this company is highly pleased with the quality and production efficiency of its small coil winding department.

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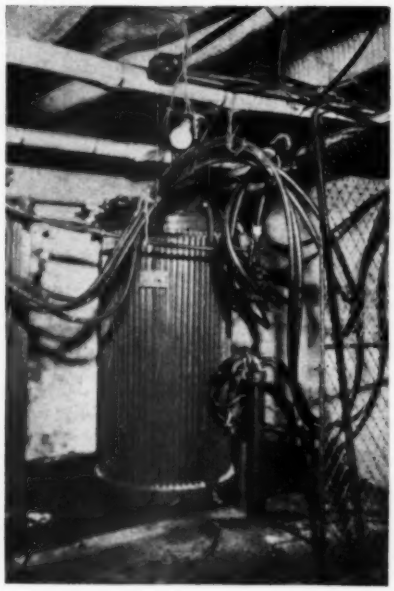
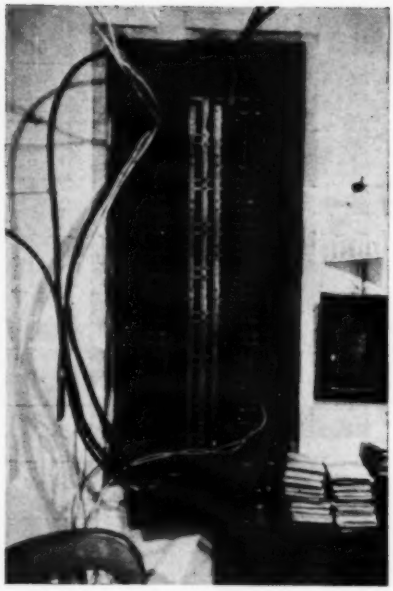




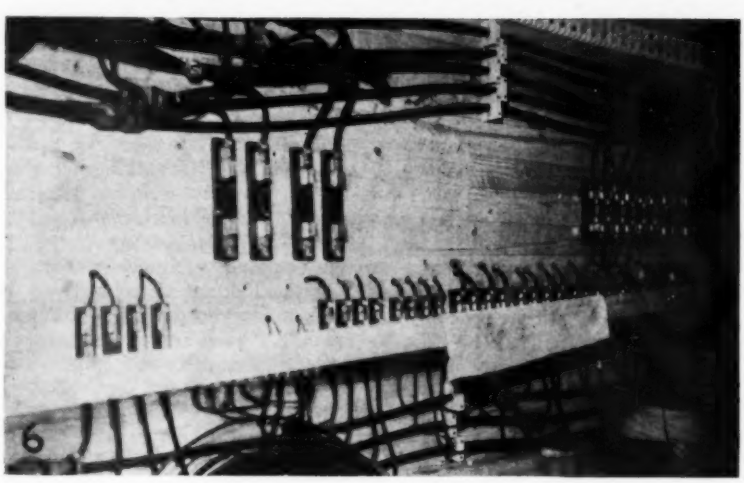
QUICK EMERGENCY

1. On the third floor in each hotel wing a 1/O temporary feeder was connected to the existing riser cables at the panelboard. The lower, water-soaked ends of the riser cables had first been cut off. Boards to support the cables were laid on the corridor ceiling molding at close intervals, like bed slats.

2. Because the basement feeders from the transformers to switchboards were under water for seven days or more, the reconditioned transformers were connected with temporary feeders to the outdoor distribution shack. There are nine 500,000 c.m. temporary cables leading to the outdoor shack.

3. With guests there must be food, therefore the various kitchen panelboards were provided with temporary 1/O feeders, after the water-soaked feeders and floor-routed branch circuits were cut loose.

4. Some of the 1/O temporary feeders served several smaller panels. Quick tap-offs were possible through the use of solderless connectors where such conditions prevailed, as in the case of a feeder branching off to two panels in the first floor service area as illustrated.



SERVICE

5. From an outside switchboard or fuse cutout shack sets of 1/O feeders were strung through windows to feed lighting risers and kitchen motors, and to the elevator controllers in the basement. Temporary gasoline engines and generators were operated in this courtyard near the shack.

6. Within the temporary distribution shack a series of 500,000 c.m. cables were bussed along the wall. From these cables short taps of 1/O were connected to fuse cutouts. These connections were quickly made with solderless connectors. The fuse cutouts used in this temporary arrangement also had solderless terminals. In the upper left may be seen five 1/O's, bunched to one 500,000 c.m. tap connector. The first set of horizontal main busses and cutouts were installed near the floor for handling the original d.c. gasoline generator system. Before the reconditioned transformers were brought back, an upper set of buses and cutouts was made ready. Thus the outgoing temporary 1/O feeders were easily cut over from temporary d.c. to a.c. one by one. After 1/O taps had been extended from the "hot" d.c. outgoing feeders to an a.c. cutout in the upper row, the fuse in the d.c. cutout was pulled and placed in the a.c. cutout above it.

A CONTRIBUTION to the procedure for quickly restoring important electrical service in an emergency was made when Hartford's principal commercial hotel, the 400-room Bond, was put out of commission during that city's recent unprecedented flood. With a water level that rose to about 4 ft. above the main lobby floor, the vital basement machinery and main control centers remained submerged for seven days before the basement water was pumped out. Emergency electrical service for guest rooms, lobby, dining rooms, kitchen, and various first floor shops and offices, was quickly provided so guests could be accommodated as soon as the waters had receded from the street.

The work was done by the Baldwin-Stewart Electric Company, local electrical contracting organization, in cooperation with the hotel's mechanical staff. Work commenced at noon on March 25. By six o'clock that evening temporary welding generators, driven by gasoline engines, were providing d.c. current over a temporary wiring system. This served with reasonable safety one wing of hotel rooms, the main lobby and kitchens. During this time utility company a.c. power was not available, and furthermore the hotel transformer station, three switchboards, the basement-located elevator motors and controls, and other machinery remained submerged in silt-laden flood waters.

Temporary Shack

An 8-ft. by 12-ft. frame building to house temporary distribution equipment was quickly built in a court beside the hotel. Three 55-volt welding generators and engine drives were set outside the "shack" temporary feeders were extended from the generators to temporary fuse cutouts mounted inside the shack, while other men were stringing 1/O feeders through upper windows to connect with dry portions of the hotel's wiring system. In the meantime the old riser cables were cut off above the water line to prevent a feed-back of the temporary current into wet cables. Others provided lines of No. 12 wire around the important areas that needed temporary lights.

Despite the rush, all work was planned to take care of a gradual growth or evolution of the temporary system. First the shack was provided to accommodate the temporary cutouts and feeder cables as they underwent a steady growth in number. Reasonable safety from accidents, electrical fires, or outages was effected by placing this temporary distribution equipment outside the hotel in a padlocked shack while also sheltering it from rain.

A diesel generator of larger capacity was put in service outdoors after the welding generators had served their limited capacity emergency purpose. Meanwhile sufficient water had been pumped and drained from the basement to permit removing the transformers for reconditioning. Motor service shops had the various motors, while elevator experts concentrated on the control devices and machinery. Power company service having been restored to some degree in the meantime, the re-installed transformers were then connected with temporary feeders to the temporary switchboard in the outdoor shack.

Safety Provisions

To make this system safe and free from frequent changes or alterations in temporary cables, the contractor made up all feeder runs of 1/O cable, and used 500,000 c.m. cables in multiple for the mains leading into the shack from the temporary generators and the transformer room. This work was kept out of the way of disconnected watersoaked feeders and distribution equipment. The removal of damaged wire, the replacement of equipment, and the swabbing of water-filled raceways could then be carried on without disturbing or interrupting the use of temporary equipment.

One of the items of electrical material that proved its usefulness for doing such an extensive temporary job safely and quickly was found to be the solderless cable connector. In the temporary shack the 500,000 c.m. main feeders were quickly tapped with 1/O's to single-pole cutouts. As many as five 1/O cables were bunched under one clamping yoke of the connector while the other connector end was made electrically secure to the most convenient place along the 500,000 c.m. feeder cable. Likewise at the transformer connections, in the kitchen, and at various motors in the basement, the 1/O cables were quickly tapped with solderless connectors. The many temporary cutouts that controlled the outgoing temporary feeders also had solderless terminals.

Remodeled quarters of the Dyer Electric Co. occupying a building that was enlarged to 40 ft. by 120 ft. The stockrooms and motor service shop are at the rear. The display window at the left in March and April featured attic ventilating equipment. Changes are made in these displays to suit seasonal demand.

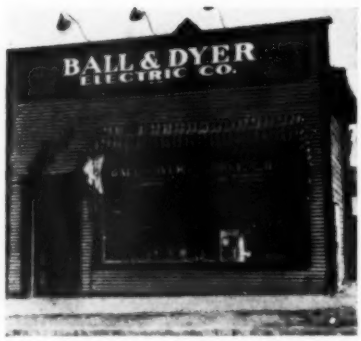
To the right of the front entrance is a 22 ft. wide, 34 ft. deep reception and display room. Selected types of commercial and industrial lighting units, and other products are arranged sparingly to avoid a cluttered display room atmosphere. Walking back to the left of the columns is a passage to the motor service shop and construction department stockroom. There are 35 flush ceiling outlets and ganged wall switch controls in the reception room, to allow a flexible mounting of lighting units.

A Modernized Contracting Shop

TO keep in step with a gradually increasing volume of industrial and commercial contracting business that was started in 1929, the Dyer Electric Company of Birmingham, Ala., recently applied the final touches to an extended program of office remodelling. Today, a complete motor service shop building finishes out this company's 120 ft. lot to the rear alley.

The front, or "customer-use" section of this organization's plant is arranged to give a business-like and orderly impression. A row of neatly furnished offices at one side provide privacy for C. S. Dyer, for the bookkeeping staff, and for estimating and engineering work. A 22-ft. by 34-ft. reception room, from which there are doors to these separate rooms, has been equipped with appropriate furnishings and just the right amount of commercial and industrial display material to maintain a correct electrical atmosphere.

Carrying out the theme of electrical adequacy, the offices are correctly lighted, and all have three or more convenience outlets. Three-way switch control is provided at all connecting doors between the row of offices. All closets are door-switched, while the ventilating system is remote-controlled from a switch and pilot station located in the reception room. Although the varied types of commercial lighting units are held to standard spacings in the display-reception room, the ceiling in this area has 35 permanent outlets to permit any desired combination of units being installed. No domestic appliances are on display.



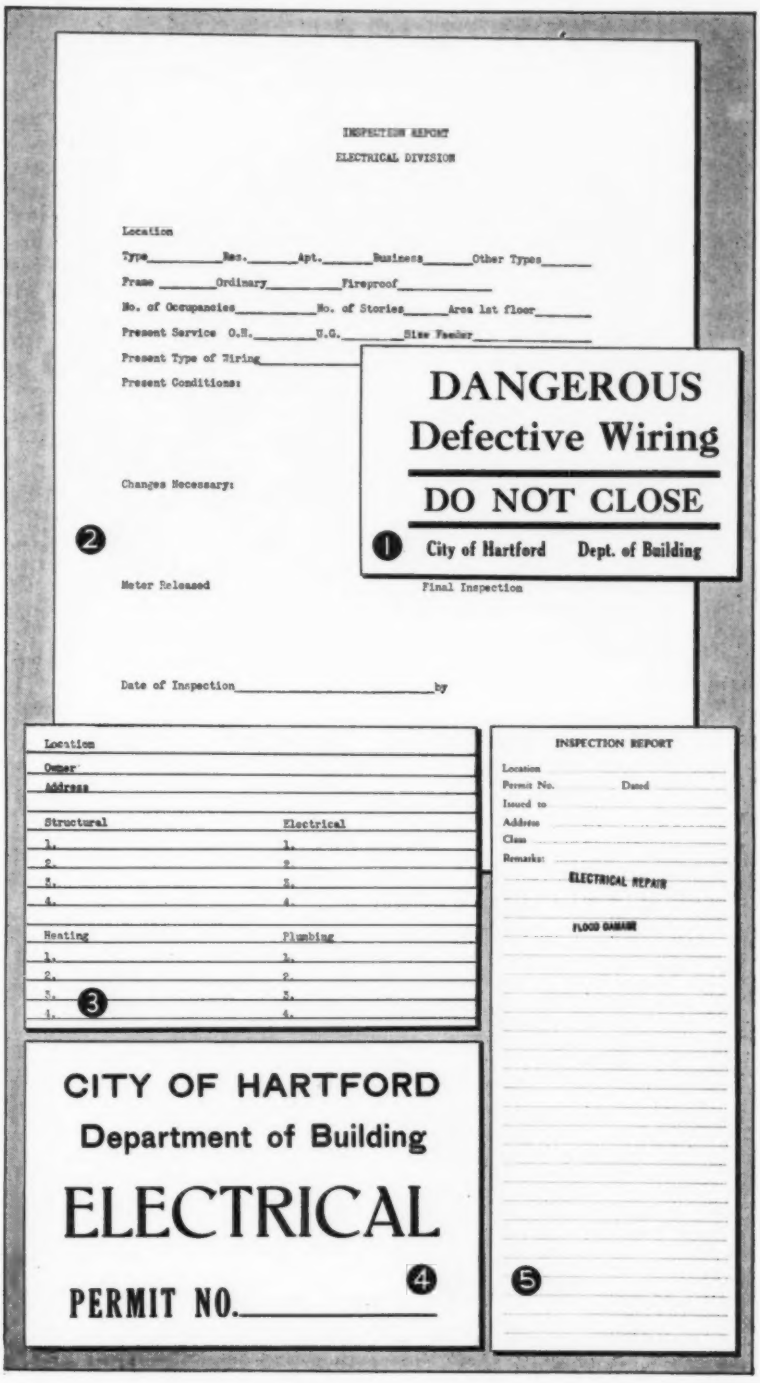
A before-modernization view

Because this company engages mainly in commercial and industrial work, its location, away from the crowded part of the city, provides a dignified and accessible place for owners, architects or builders to come in the daily routine of business.

Window displays are varied to provide a harmonious setting to tie in with this firm's activities. Attic ventilation for stores, small theatres and larger homes amounted to 52 installations in 1935, averaging about $200 each with wiring. This type of equipment is displayed during the spring season in one of the windows and in the reception room.

Aggressive effort for cultivating a steady volume of smaller orders to supplement this company's larger operations has brought about a volume of business which necessitated an expansion program such as has been described.

Safety Procedure in Hartford Flood Area



WITH about 1,760 buildings in Hartford, Conn., affected during its recent record flood, the procedure that was employed to quickly place under orderly control the water-soaked wiring systems within those structures has prevented so far as could be determined any cases of electrical fires or shock injuries to its citizens. A special inspection staff operating under the direction of Joseph P. Rohan, that city's chief electrical inspector, entered the flooded areas as soon as the flood waters receded. All wiring systems that bore evidence of having been under water were disconnected and labelled "Dangerous Defective Wiring Do Not Close."

1. Danger labels were placed at all disconnected service switches.

2. Special forms for field inspectors.

3. Temporary cards contained a summary of inspection reports from four cooperating divisions.

4. Permanent repair work requires a permit, for which a permit placard is issued.

5. Detailed inspections of flood damage repairs are recorded.

Electrical contractors and wiremen were deputized to make up the first cut-off crews. As the demand for some of these men to do temporary wiring became acute, they were replaced with a special detachment of experienced non-commissioned U. S. Navy electricians who were secured from the submarine base at New London, Conn. These men were instructed regarding general procedure and detailed to do actual inspection work.

The flooded areas were divided into six zones, each having five to seven electrical inspectors who reported service disconnections and in-

UMI

spections to a centrally located zone office. Each zone had a supervisor and a messenger or runner, and all zones were checked periodically by a general supervisor. Specially prepared inspection reports were filled out by the inspectors, copies were retained in the zone offices, and the original reports then forwarded to the municipal building. An average daily total of 300 inspections were recorded under this system. Many call-backs and special rush calls were made to previously inspected premises in various zones, which did not appear on this record.

When power service was restored, the public began clamoring for permission to again use their disconnected electrical systems. Because only qualified contractors were permitted to provide temporary service connections, and because only the above-the-water portions of wiring systems could be used, the zone reports that had already been made provided a short-cut method of procedure. Zone supervisors were able to give instructions to owners or contractors in most cases, thus avoiding the confusion and delay that would have occurred if all such details had needed to be settled at the municipal building. Quick service was rendered to special cases by despatching men with the contractor or owner. Definite instructions could thus be given out verbally at the premises on short notice.

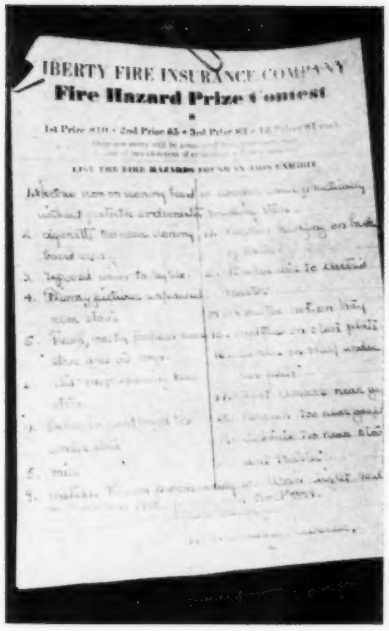
Temporary connections to serve the undamaged portions of wiring systems were mostly made without metering facilities, with the general permission of the Hartford Electric Light Company. Such connections were allowed to include temporary lines into areas of the building wherein the water-soaked permanent wiring had been cut loose. Such unmetered services were permitted until the power company was able to make other arrangements for metering. Flat charges for the current used in the interim will be determined later on with each customer.

To coordinate the electrical inspectors' field reports with telephone inquiries that were made to the main office, and also to keep the electrical men working in close cooperation with inspectors of the health, building and plumbing inspection departments, a temporary recap or summarized inspection report of all four departments was developed that forestalled confusion. These summarized reports also permitted all departments to determine quickly any special condition or exceptional hazard that might need to be considered before giving a clearance to a structure.

All field reports have been summarized in the main office, to the end that all temporary services are on record. These records can be followed up periodically to weed out all temporary service records as soon as permanent wiring facilities have been provided. No permit fees were charged for temporary wiring, but all permanent replacements of damaged wiring will require permits and final inspection.

Here then, with a general state of confusion existing, and with a frantic public to pacify, and to protect against the dangers of water-soaked electrical equipment, an orderly procedure has successfully coped with an emergency. Score—no electrical fires, no shock injuries, no fatalities of record.

Some outdoor fuse boxes in one of the flooded business areas which were opened and provided with "Danger" warning labels by electrical inspectors. These boxes are connected to an underground service network, and lead-ins from these boxes extend to various meter locations.



One of the forms as filled in by a contestant. The form was 6½ in. wide and 9 in. long. Contestants were permitted to use as many pages as they cared to fill out.

A DISPLAY of home fire hazards which was sponsored by a fire insurance company during a recent Home Show held at Louisville, Ky., caused 1500 persons out of the eighty thousand who attended the show to file written inspection reports in competition for a series of cash prizes.

The idea for such a display booth, which consisted of a small crowded room with numerous examples of electrical and non-electrical fire hazards, originated with and was carried out by the Liberty Fire Insurance Company of Louisville, Ky. Conducted solely as a vehicle for placing its name before the people, the public interest was said to have exceeded all expectations. The quality and accuracy of the 1500 written reports, the careful inspections made by contestants during their preparation, all caused the officers of the company to feel that an expenditure of about $350 for this educational display was a most successful venture.

Each contestant was given an unlimited time to list on printed forms the fire hazards he could detect in the room. The one listing the largest number accurately received a first prize of $10.00. There was a sec-

Analyzing the Public's Interest in A Fire Hazard Contest

LIBERTY FIRE INSURANCE CO.
15 PRIZES $30.00 IN CASH
FIRE HAZARD CONTEST
How many Fire Hazards in this Room?
"ASK FOR CONTEST FORMS HERE"
15 PRIZES $30.00 IN CASH

The hazard display booth portraying crowded living quarters contained defective wiring, carelessly used electrical appliances, and other potential fire hazards. The counter in front of the booth was used by the contestants for writing their inspection reports. Two attendants were present to keep the crowds moving along and to speed up the reports.

ond prize of $5.00, a third of $3.00 and twelve of $1.00. The fifteen prizes in all amounted to only $30.00. The average contestant spent approximately half an hour writing up a report, and some required three and four pages to list their findings.

A RANDOM STUDY OF 20 HAZARD CONTEST REPORTS

Cases	No. Items	Electrical
1	22	6
2	19	3
3	17	3
4	20	5
5	34	8
6	20	6
7	21	6
8	29	8
9	23	3
10	18	4
11	42	10
12	50	11
13	17	4
14	18	2
15	33	11
16	22	3
17	30	9
18	10	1
19	21	6
20	35	11

One report, which listed 108 hazards, was filled out in three hours time by a young lady contestant.

A review of twenty reports, as taken from an alphabetical group of contestants was made by a staff member to determine the number and kind of hazardous electrical items reported. From these twenty reports it was also possible to select the twenty most commonly named electrical hazards. Among the twenty reports there were about forty various lay terms for electrical hazards. Some reports limited their electrical hazard items to the all-inclusive term "bad wiring," while others ran up a list of ten and eleven separate citations, as will be noticed in a tabulation of these twenty contest blanks.

To conduct this display it was necessary for the company to keep two shifts of two men per shift on duty in the booth. No assistance was given by these attendants to any contestants regarding the listing of hazards. Their time was devoted to supervising the crowd at the booth, and to depositing completed blanks in regular election ballot boxes after the names and addresses appearing on them had been checked for legibility. The judging committee for this contest was composed of two advertising executives and a member of the local insurance actuarial bureau. Their awards were announced in a large advertisement in the Louisville *Courier-Journal*.

SOME TYPICAL LAY TERMS FOR ELECTRICAL HAZARDS

19 Iron on iron board no pad
8 Toaster too near curtains
7 Worn out light cords
6 Bad wiring
6 Cords over nails
5 No insulation for wires on ceiling
4 Exposed wires to lights
4 Broken wire to toaster
3 Uninsulated lamp cords
3 Defective wiring
3 Two many lights in one socket
3 Poor insulation on wires
3 Poor plug on light socket
3 Wires not properly connected
3 Lamps too close to materials
3 Iron cord in bad condition
2 Toaster left connected
2 Iron left connected
2 Twisted toaster cord
2 Light globe too large for cords

Construction . . Methods . . . .

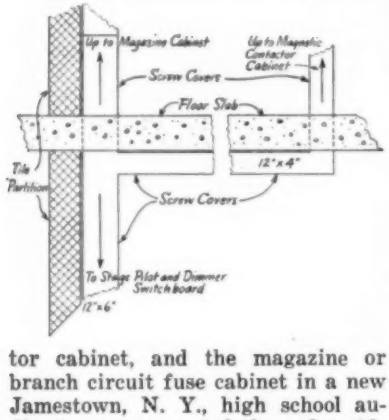
Quick Outlet Line-Up

In doing a rush commercial rewiring job at Atlanta, Ga., the Peters Electric Company installed rows of ceiling outlets in several typical bays

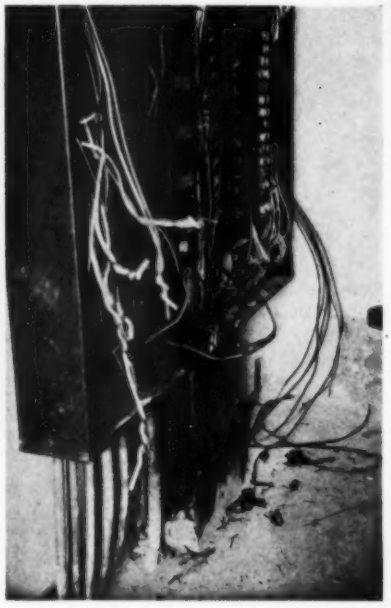
and halls before the new partitions were completed. By first installing the end ceiling outlet positions, and stretching heavy chalkline between them, the in-between outlets were quickly and accurately aligned for the roughing-in crew.

Wireway for School Auditorium Controls

The connections between the stage pilot and dimmer control switchboard, the remote-controlled contac-



tor cabinet, and the magazine or branch circuit fuse cabinet in a new Jamestown, N. Y., high school auditorium were routed through a 12-in. by 6-in. T-shaped sheet metal wireway. The magazine cabinet occurred directly above the pilot board, while the contactor cabinet



was installed in the same room with, and facing the magazine cabinet. Therefore, that portion of the wireway which is shown connecting to the bottom of the magazine cabinet has a horizontal tap-off on the ceiling below, which extends up through the floor into the contactor cabinet. This installation was made by the Linquest Electric Company of Jamestown, N. Y.

Masked Ceiling Anchor Bolts

Bridge washers and ¾-in. conduit spacer nipples were used to hide the hanger rods which were extended through a suspended ceiling to support a neat conduit layout in the main control room of the new armory at Jersey City, N. J. This method concealed the jagged holes that were cut in the plaster and metal lath when the rods were made secure. The hanger rods were provided with large washers at the upper ends and hung through the rough concrete floor above. When the bottom nuts were taken up, the spacers and washers acted as stops when each bar had been drawn parallel with the

finished ceiling. This provided a rigid rack that has a finished appearance in keeping with the smooth ceiling surface. Joseph Newman, Inc., of Jersey City, N. J., who installed this work chose this method in a desire to obtain a rigid and neat looking installation in a room which will be somewhat of a show place for visitors to the armory.

Bench Type Tote Box

For those smaller concrete form jobs, where the work bench must be moved frequently to be at the center of things, and at the same time ac-

commodate a generous quantity of tools and materials to prevent them from being kicked around by other workmen, the Peters Electric Company, Atlanta, Ga., uses light-weight wooden work benches. Using a 2-in. by 12-in. by 5-ft. top board, and four 2-in. by 4-in. legs to make the bench 32 in. high, there is a 3-compartment, 16-in. by 40-in. bin beneath for miscellaneous items of materials and

a GOOD Type D Switch

THE primary purpose of any safety switch is to make, to carry, and to break a current. Proper current-carrying capacity demands strong pressure of the jaws on the blades. If pressure is weak, contact becomes faulty, heating develops and trouble begins.

With the growing demand for long and satisfactory switch life, additional precautions must be taken. You have to measure... you have to KNOW... what the trade needs to give that service regardless of whether it be a Type A switch, a Type C or a Type D. However, we repeat, the *basic* requirement of any safety switch, for any service, is adequate contact pressure.

Study the C-H line to see how each type is built *especially* to meet the needs for which you want to use it. Then note that regardless of which switch you select, there will be no departure from time-tested principles. You *actually* get adequate contact pressure in every Cutler-Hammer switch. Thus, you can select it with the full knowledge that you are getting the best switch *time, talent* and *money* can produce. Your business is *safest* with the C-H Safety Switch line... leaders in Current-Carrying equipment. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus*, 1306 St. Paul Avenue, Milwaukee, Wis.

The Pull Test

Grab the crossbar as shown above... pull the blades out by hand. If it is easy to pull the blades out, pressure is weak, contact is faulty, and the switch will not give satisfactory service. On the other hand, if the blades are hard to free, held firmly, as in C-H Switches, you have excellent contact, long life, super-satisfaction.

● *The C-H line includes all types and sizes of Standard, Weatherproof and Explosion-Proof Safety Switches, and Range Switches and Service Equipment for every locality—all built to the famous C-H Control Leadership Standards.*

CUTLER-HAMMER

C-H

SAFETY SWITCHES

Reduced prices on Westinghouse MAZDA LAMPS make better light cheaper

● Large size Westinghouse Mazda Lamps are now offered at the lowest prices in history.

Reductions average 20% on the most popular sized lamps for selling and manufacturing, and for sight-saving in the home. Now, more than ever, everyone can afford Better Light—Better Sight.

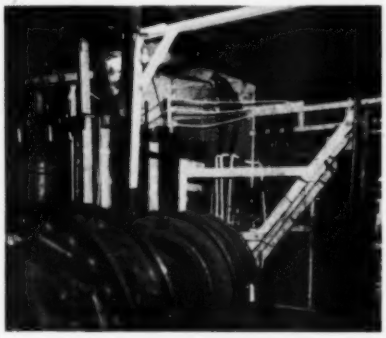
This offers new possibilities to economically modernize existing lighting systems, permitting the use of more lamps and higher wattage lamps for Better Light—Better Sight.

WESTINGHOUSE GOLDEN JUBILEE

tools. This bin is made from ¾-in. lumber, and provides the braces to prevent wobbly legs during the use of the bench top for cutting and bending electrical metallic tubing. Because the 2-in. by 12-in. top projects out beyond the bin and supporting legs, convenient carrying ends are available for two men to move the outfit on stairs or over rough ground.

Emergency Power Plant

What was before the flood a busy loading dock at the rear of a large Pittsburgh, Pa., department store became one of the largest private temporary power plants in that city.



The Franklin Electric Construction Company provided some initial elevator power with a temporary bank of three 100-kva. 4,000-volt transformers and two 100-kw. m-g sets (in extreme background). Later a 300-kw. m-g set (in foreground) was secured, necessitating more transformers. Also 600 kva. in temporary lighting transformers was provided. This provided a temporary plant which permitted this huge store to operate full blast before Easter, although its water-soaked main switchboards and feeders had all been disconnected. About 60 men were required to install this equipment and the temporary feeders leading to various parts of the store.

Multi-Color Tracings for Electrical Plans

Complicated electrical layouts are said to be greatly simplified for the layout draughtsman through the use of several colors of ink in making linen tracings, at the offices of Ray W. Chanaberry, Inc., Louisville, Ky., electrical system designing engineers. The more common routings of circuits and small feeders are

You Can Tell at a Glance

WHEN THE CONCEALED CONTACTS OF THE BULL DOG

Vacu-Break

SAFETY SWITCH

ARE IN THE "OFF" POSITION

Standard Line
Catalog No. 27353
100 Amp. 575 Volt 3 Pole
NOT FUSIBLE

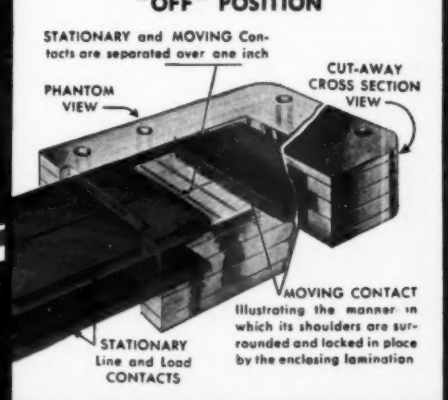
SELF ENCLOSED—YET SELF DISCLOSING

The moving contacts are embedded, or wedged, beyond possibility of detachment, in the upper section of the enclosed arc chamber. Its ends are completely enclosed on all four sides by the locking shoulders of the overlapping laminations, so that it definitely moves with the operating handle in and out (ON and OFF) on the stationary Line and Load contacts, as illustrated.

In the above illustration, Figure 1 shows the switch in "ON position." Note the moving arc chamber is fully down on Line and Load contacts, whereas in Figure 2 "OFF position" the arc chamber has moved outward, exposing the Line and Load contacts. In the "OFF position" the moving contacts are separated from the stationary contacts by over a full inch of space.

THE VISUAL EVIDENCE OF THE "ON" or "OFF" POSITION OF THE CONTACTS IS JUST AS OBVIOUS AND POSITIVE AS THE "ON" or "OFF" POSITION OF THE OPERATING HANDLE.

STANDARD TYPE ARC CHAMBER "OFF" POSITION


STATIONARY and MOVING Contacts are separated over one inch
PHANTOM VIEW
CUT-AWAY CROSS SECTION VIEW
MOVING CONTACT Illustrating the manner in which its shoulders are surrounded and locked in place by the enclosing lamination
STATIONARY Line and Load CONTACTS

BULL DOG

Vacu-Break

SAFETY SWITCH

BULL DOG ELECTRIC PRODUCTS CO.

DETROIT, U. S. A.

Bull Dog Electric Products of Canada, Ltd., Toronto, Ontario

For The FIRST TIME . . .

. . . an 18" modern styled, nationally known Air Circulator of the highest quality can be purchased in the same price range as an ordinary 16" oscillator.

The 18" SUPER AIR SCREW now sells for only $38.50 list! Larger sizes are priced proportionately low.

In other words, SUPER AIR SCREWS now give you a *price* advantage . . . a *beauty* advantage . . . a *quality* advantage . . . a *performance* advantage . . . and, with our longer discount arrangement . . . a *profit* advantage.

Surely you can't ask for a more perfect set-up. Surely you are interested in getting our complete proposition. Write or wire.

SIZES: 18" to 30" blades — all currents — all speeds

Super Air Screws Division

MARATHON ELECTRIC MFG. CORP., Wausau, Wisconsin

SUPER *Air* SCREWS

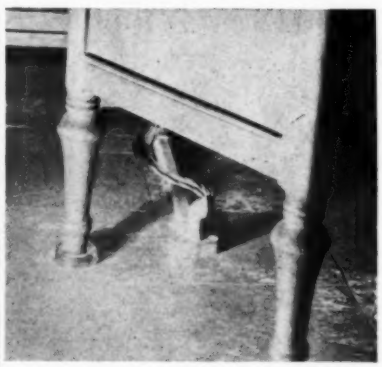
traced in black India ink for maximum contrast in the blueprint. Building outlines are inked in red or orange. If still more faint lines are desired in the print, to show the run of beams, ceiling panel outlines, etc., a blue ink is used. Often a complex array of feeder conduits in crowded areas is shown in green ink. Because these different colors produce varying degrees of contrast in the blue print, it is less confusing to distinguish important electrical details.

The use of colored ink also results in a highly distinctive color code upon the master linen tracing, which saves much time in the office when making revisions of a layout, and also when anyone is called in to consult with members of the staff about various phases of a large electrical job.

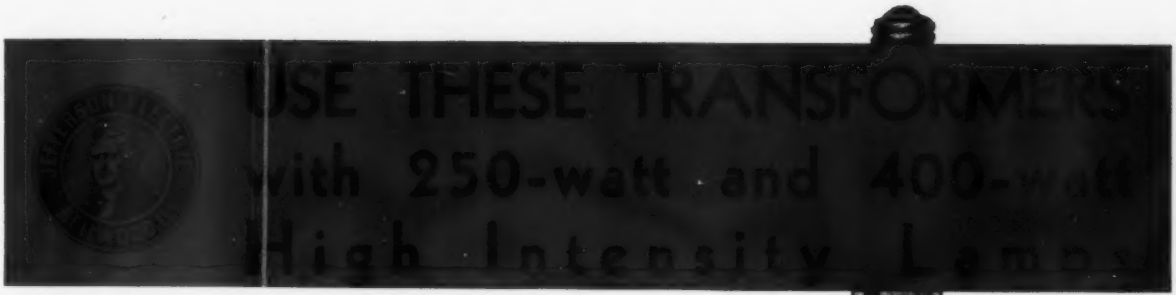
Due to the advantages of this color-tracing method, all jobs involving more than $2,000 or $3,000 in wiring, and according to their complexity, are laid out in ink on tracing cloth. Before the ink tracing is prepared, a pencilled tracing is made, from which preliminary blue prints are submitted to the architect or owner for their approval as to layout and accuracy.

Under-Desk Extension Raceway

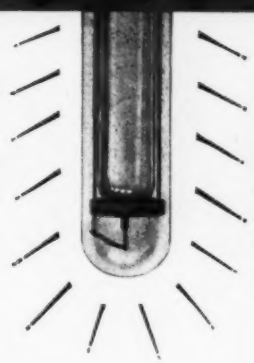
To eliminate dangling signal and telephone wires that extended from the wall to a desk in a private office of an old Cincinnati, O., office building, surface metal raceway was in-



stalled on the floor from beside the baseboard to beneath the desk to enclose these conductors. A two-piece nozzle fitting was installed under the desk, from which the wire was routed to desk-mounted terminal blocks. Extra slack was left in a taped-up coil, should the desk be moved during cleaning operations.



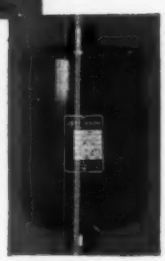
Keep Power Costs Down
Lamp Efficiency Up



The new mercury vapor lamps give more light per unit of current—reduce electric bills—Jefferson Transformers insure maximum economy.

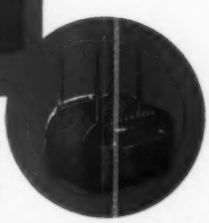
More and better light per dollar is available through the new high intensity mercury vapor lamps—and the specially designed Jefferson Transformers insure the full rated capacity and efficiency of these lamps.

Wall Mounted Type in neat metal case for mounting on wall or post. Bottom is open for ready access to wiring compartment. Snap-on connections make it easy to match primary supply line voltage. Cat. Nos. 232-401,232-411,232-421, 232-431.



Fixture or Suspension Type for mounting between ceiling and lamp—with standard threaded coupling at each end. Cat. Nos. 232-501, 232-511, 232-521,232-531.

Weather-proof Typeinone-piece drawn steel case—interior compounded. Connections at bottom. Cat. Nos. 232-601, 232-611, 232-621, 232-631.



Core and Coil Type—which fits in fixture. Vacuumized, impregnated with final double varnish dip, baked. Cat. Nos. 232-301, 232-311, 232-321, 232-331.

Meter readings show an extremely low current demand during the starting period and on continuous operation there is a low temperature rise—important advantages in Jefferson Transformer performance.

Jefferson's long specialized experience in the development of transformers for mercury vapor and Neon luminous tubes, sun lamps, street lights and the like, makes possible the high quality special types of transformers and reactors required to insure the greatest lighting efficiency.

Made in types for both 250-watt and 400-watt lamps to suit all applications—generously designed to provide long life and low cost lighting with the new mercury vapor lamps. . . Ask for Bulletin 351-MV. JEFFERSON ELECTRIC COMPANY, Bellwood (Suburb of Chicago) Illinois. *Canadian Factory:* 535 College St., Toronto.

JEFFERSON *Mercury Vapor Lamp Transformers*

The consumer's confidence in a product is its best salesman.... The seller's confidence in a product makes *him* a better salesman.... Confidence is the stuff of which success is made.... Know your product, know its worth, prove its value—in other words, establish confidence and you have the secret of success.... There is no substitute for confidence.... There is no substitute for Safecote.... Safecote has the consumer's confidence; it has the seller's confidence—a confidence backed by the leading wire manufacturers.... Safecote wire must be built to Safecote standards: flame retarding; moisture resisting; fishable, slick finish; fadeless colors.... Every foot must be tested....

UMI

is no substitute for

Confidence

ELECTRICAL CONDUCTORS

FLAME RETARDING MOISTURE RESISTING
SAFECOTE
FISHABLE — SLICK FINISH
REG. U.S. PAT. OFF.

U.S. LETTERS PATENT NUMBERS:

1,635,829	1,772,436	1,765,000
1,798,486	1,410,790	1,536,549

OTHER PATENTS PENDING

LOOK FOR THIS TRADE MARK
INSIST UPON GENUINE SAFECOTE

The Safecote Laboratory, guarding these standards, is at your disposal for your protection. . . . Build your business upon Safecote standards—Safecote confidence.

SAFECOTE PERFORMANCE SPECIFICATIONS AVAILABLE UPON REQUEST.

GEORGE C. RICHARDS, LICENSOR'S AGENT—155 EAST 44TH ST., NEW YORK CITY

Service Shop . . . Practice . . . . . .

Flat Wire Re-Shaper

An adjustable rolling mill for the service shop, to be used in re-shaping rectangular copper magnet wire from available stock to fit the peculiar dimensions of large rush jobs, such as large armatures or wound rotors has been designed by the Cleveland Electric Company, Atlanta, Ga. This motor-driven unit has adjustable rollers which can be set to a reasonable degree of accuracy. The extent to which a given size copper bar must be compressed or rolled in order to change it to another dimension is quickly determined by running through a few scrap lengths of cleaned copper. When the exact roller tension has been determined, the next step is to re-shape an approximate rotor bar or coil length, allowing for elongation. Usually the second or third length that is run through will reveal the exact lengths to cut, which, when re-rolled and somewhat elonggated, will be just the right length for the job.

Before re-shaping, the original rectangular magnet wire stock is cut into lengths, as before explained. These lengths are then cleaned of cotton or silk coverings upon a rough emery wheel. On some types of copper a hand scraping tool is used which employs razor blade cutters that operate by spring tension. Because the rolling process usually hardens and stiffens the copper too much for easy workability, the re-shaped lengths are tied in bundles of 20 or 30 conductors and are annealed over a plumber's furnace. After annealing the coils are ready for taping and forming, as would be done with other similar re-winding work.

Overhead Transportation System

From delivery trucks to apparatus stocks at left; to motor service and transformer repair shop at right; and for a distance of 80 ft. to the small parts stock rooms in the extreme background, runs this overhead monorail system in the jointly-occupied quarters of Anderson's Inc., and Electrical Construction, Inc., Nashville, Tenn. Chain-pulls near the receiving dock are operated to throw the switch for directing loaded travelling chain hoists to their destination. In addition to the monorail system a travelling crane is located in the long parallel repair shop space at the right. This crane is used to take heavy incoming apparatus from the monorail for transporting it to any desired work location in the shop.

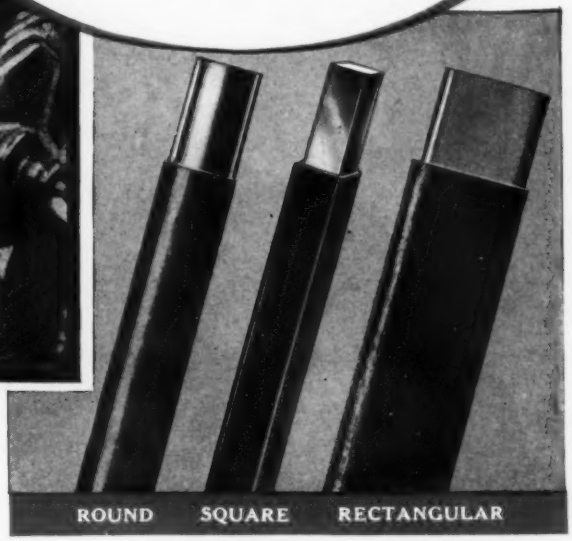
Adjustable Armature Stand

A non-tipping Y-jawed adjustable stand for armatures or rotors up to about 75 hp. was made up in the Jacksonville (Fla.) Armature and Motor Works of standard stock materials. The main horizontal bed was made from two pieces of ½-in. by 4½-in. by 42-in. flat iron overlapping the end legs. The end legs were made from ½-in. by 2-in. iron, a bottom tie rod of ½-in. water pipe, flattened at the ends and bolted on near the floor. The Y-shaped shaft supporting yokes were made from two pieces of ½-in. by 3-in. flat iron, and have sheet copper over the jaws to make for easy rotation of heavy work, and to avoid scoring shafts. One yoke is bolted in permanent position while the other slides upon the horizontal bed. The sliding yoke may be locked in place by means of an underslung wing nut.

Electrical Turn-Counting Cutoff Disc

Coil turns are accurately counted and the winding head is automatically stopped when any desired number of turns up to seventy-five have been wound by means of a chain-and-sprocket driven counting disk attached to winding machines at the Armature Winding Company, Charlotte, N. C. A 14-in. diameter disk of ¼-in. thick fibre was provided with a chain-driven clock-wise rotating contact arm. The outer rim of the disk has seventy-five drilled and stencilled holes into which the holding pin on a contact block may be seated. When the rotating arm has traveled around the disk to any numbered hole in which the contact block is placed, the holding coil on a

A COIL OF WIRE MAY CREATE NEW CUSTOMERS!



Wind Motors with Deltabeston Magnet Wire with PURIFIED Asbestos Insulation

Every first-rate motor repair job you do helps to increase your business in two ways. First, your satisfied industrial and commercial customers will give you more work. Second, they'll recommend you to other firms so that you gain new customers.

Wind motors with Deltabeston Magnet Wire and you're certain to make a superior installation. Deltabeston's new *Purified* Asbestos Insulation has far greater dielectric strength, and is more resistant to heat, moisture and acids, than any other magnet wire insulation. *Purified* Asbestos is *exclusive* to Deltabeston.

In addition, the insulation is tougher, yet more flexible. It won't crack when the wire is bent at sharp angles.

Send the coupon now for samples and complete information.

Deltabeston Wire and Cable Division
Section Y-683
General Electric Co., Bridgeport, Conn.

Please send me samples of the improved Deltabeston Magnet Wire and your new Deltabeston Catalog describing the *Purified* Asbestos treatment.

Name.....

Company.....

Street.....

City.....State.....

GENERAL ELECTRIC

DELTABESTON WIRE AND CABLE

APPLIANCE AND MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONN.

SCATTER IT!

THAT'S THE WAY TO PUT OUT A FIRE

...*and* THAT'S THE WAY THE "DE-ION" ARC QUENCHER MAKES THE NEW WESTINGHOUSE LINESTARTER *Super Safe*

The simple, positive principle of the "De-ion" Arc Quencher completely ends the usual flash and flame upon contact opening. The metal grids scatter the arc and quench it instantly, *inside the arc box*—like putting out a fire by scattering it into small sections. Just imagine the safety this revolutionary design brings to the new Westinghouse Linestarters—and remember that only Westinghouse can give you this and many other advantages. The new 1936 line has a size and type for every requirement.

For complete details on new Westinghouse Linestarters, write or call your local: J 20039

WESTINGHOUSE OFFICE WESTINGHOUSE AGENT-JOBBER
WESTINGHOUSE INDUSTRIAL AGENT OR DEALER

HOW IT WORKS . . .
In the past, arcs have been broken by "stretching." The "De-ion" arc quencher confines, divides and extinguishes the arc instantly—obviously preventing concentration of heat on contacts and arc barriers.
THE OLD WAY
THE "DE-ION" WAY

LONG LIFE—*Instant "De-ion" arc quenching means no pitted contacts*—practically unlimited contact life. Simple mechanism with fewer parts.

COMPACT DESIGN—*Banishing of arc hazard by the "De-ion" quencher permits a snugly-built, compact mechanism* retaining ample wiring space and complete accessibility of all parts for quick installation or inspection.

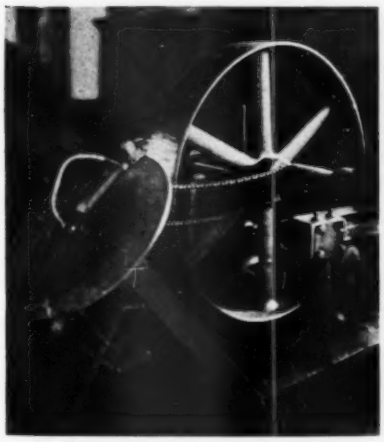
RELIABILITY—The "De-ion" arc quencher confines, divides and extinguishes the arc without the usual flash and flame—insuring freedom from flash-overs, high overload capacity and dependable, trouble-free operation

WESTINGHOUSE 1886 W 1936 GOLDEN JUBILEE

Westinghouse

"DE-ION" LINESTARTER

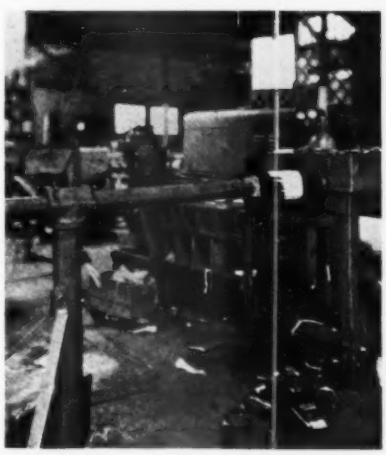
magnetic switch is shunted or paralleled, causing the winding head to stop automatically. The sprocket wheels for this counter disk contact



mechanism were made of the correct size to provide accurate ratios between revolutions of the winding head shaft and the rotating contact arm.

Quick-Aligning Transformer Core Winder Spindle

By babbitting small ball bearing races into the bevelled centers at opposite ends of transformer cores, the Orlando (Fla.) Armature Works, Inc., has a means of aligning them



quickly upon the winding machine heads. By means of a core clamp on the drive shaft the transformer core is revolved while the adjustable outboard centering spindle is stationary. Being set firmly into the babbitted bearing this spindle holds the inner race, while the outer part of the babbitted bearing shell revolves with the transformer core. Powdered fire clay is sprinkled upon the core laminations before the bear-

NEWS
FROM WIREMOLD
"THE BUSINESS BOOSTER FOR CONTRACTORS!"

THE WIREMOLD COMPANY ◆ ◆ ◆ HARTFORD, CONN., U. S. A.

—Lumiline lamp mounted on Wiremold LIGHTING STRIP—with Wiremold Lumiline Fittings

Simplifies Lumiline Installation!

BOOSTS BUSINESS FOR YOU

LIKE all other Wiremold innovations, the Wiremold Lumiline system makes prospective jobs easier to sell—and jobs-in-hand easier to handle at a profit!

A Reminder to Contractors!

Now is the time to contact school boards and institutions to line up summer vacation business!

How a PITTSBURGH ELECTRICAL

Westinghouse Nofuze Circuit Breakers economically replace fused equipment—in addition providing complete safety for operators and positive, permanent protection for electrical circuits, with *nothing to replace* . . . no delays in restoring service. Available in ratings from 15 to 600 amperes at 125 to 250 volts d-c., or 115 to 600 volts a-c.

He checked up on the old wiring system in a large dairy and found that many circuits were greatly overfused . . . that a number of the overload devices were unreliable . . . he proved that inadequate circuit protection and resultant maintenance were costing $3,000 a year.

1. SOLD NOFUZE CIRCUIT BREAKERS

As a result of this check-up, he sold a complete Nofuze Circuit Breaker installation.

2. GETS CONTRACT FOR NEW WIRING

Naturally, the installation of Nofuze Circuit Breakers called for a profitable wiring job.

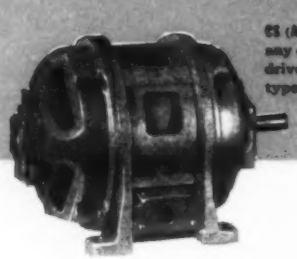
3. LANDS MAINTENANCE CONTRACT

The dairy manager was so enthusiastic over the savings effected, and the installation operated so satisfactorily, that the contractor was given complete responsibility for all electrical maintenance in the entire plant.

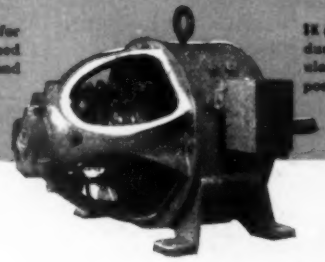
Ask your nearby Westinghouse Electrical Jobber for complete information and for proof that Nofuze Circuit Breakers save money.

Westinghouse

J 20063



CS (A-C.) MOTORS for any constant-speed drive—All sizes and types, 1 hp. up.



DX (D-C.) MOTORS Industry's most popular general purpose d-c. motor.

FRACTIONAL HP. MOTORS for a-c. or d-c. service—most widely diversified line of small motors on the market.

CONTRACTOR DID A ... *Triple Selling Job*

WITH NOFUZE CIRCUIT BREAKERS

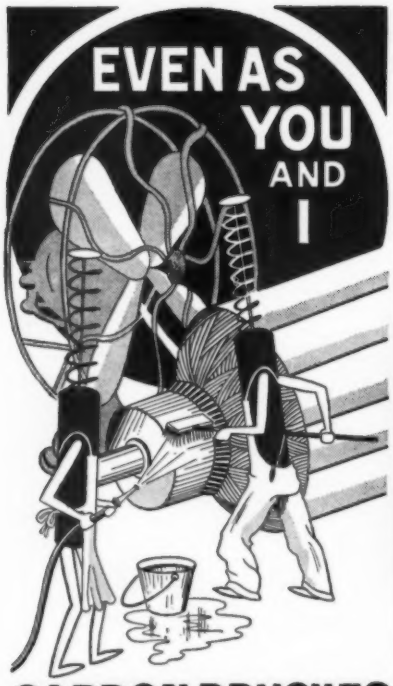
BID "All Westinghouse" FOR UNDIVIDED RESPONSIBILITY

YOU CAN DO THE SAME Fuseless circuit protection is *your* opportunity to re-interest your customers on wiring jobs they have put off. Check up on their losses due to inadequate circuit protection and then tell them how Nofuze Circuit Breakers eliminate these losses. And remember, one good installation will help you obtain others quickly.

Draw on this complete line, perfected by 50 years of electrical experience . . . backed by a mighty name.

NEW "DE-ION" LINESTARTERS— (Left) Most important forward step in entire history of motor control equipment.

"DE-ION" SAFETY SWITCHES (Right) Of every size and type, with exclusive "De-ion" principle of arc interruption.



CARBON BRUSHES DO SPRING HOUSE CLEANING

Like anything else, electric fans will gather plenty of dust and lint during winter storage. When taken out, the winter's accumulation is carefully wiped from the blade, base and motor housing but as a rule the *commutator* goes untouched... perhaps because many fan owners don't even know what the word means.

It therefore becomes the duty of the carbon brushes to clean up the commutator *without wearing it* and to achieve this characteristic in brush material requires considerable engineering background.

So Here's a Tip

When you sell brushes for "fan time" which will soon be here... Be sure they're built for "Spring Commutator Cleaning".

USE OHIO PRE-TESTED MOTOR BRUSHES EXCLUSIVELY

THE OHIO CARBON CO.
12508 BEREA RD.·· CLEVELAND, O.

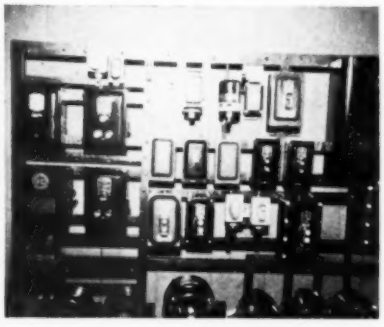
ing races are temporarily babbitted on, thus preventing babbitt from flowing into the core interstices. When a core has been rewound these races and the babbitt are easily pulled off.

Triple-Deck Motor Storage

By building a series of rugged 3-deck motor storage racks and providing a travelling crane for the removal or placement of motors on the desired storage shelf, the Willey-Wray Electric Co., of Cincinnati, O., keeps an average stock of 2,000 large motors in an orderly and get-at-able arrangement in a comparatively small motor storage room.

Customer-Interest Display of Control Apparatus

Because industrial plant engineers not only like to see, but also like to handle and "get the feel" of various industrial control devices, the Wm. C. Krauth Electric Company's service department office arrangement includes a substantial steel wall rack, upon which an assortment of magnetic switches, pressure and limit switches, and push button switches are mounted. These have been selected from standard types, and also from vapor proof and explosion proof types. Some of the small items are mounted on swinging pipe fittings to permit the customer turning the devices from side to side in order to examine them thoroughly.



SHAWMUT SHUR-LAG
RENEWABLE FUSES

★ **Can be assembled ONLY one way . . . the correct way.**

★ Shawmut Shur-Lag Renewable Fuses are sturdily built and provide greater time lag under unusual overload conditions.

★ Ferrule Type permit speedy renewal . . . plenty of room to insert link in fuse case . . . Ferrules have deep screw driver slots.

★ Links are of uniform thickness . . . can be inserted from either end of fuse case.

★ After blowing, fragments of link can be quickly, easily removed.

★ Knife Blade Type have no small parts to become lost or mislaid in refilling . . . simple and efficient in design.

★ Permanent rigid blade alignment . . . Blades are assembled to an extra heavy insulating crossbar.

UND. LAB. APPROV.

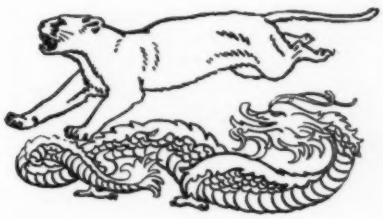
Send for Shur-Lag Folder. It contains prices, etc.

THE **CHASE-SHAWMUT CO.**
Dept. D
Newburyport, Mass.

Fuse Specialists Since 1893

PANTHER *and* DRAGON *Tapes*

PANTHER and Dragon Friction and Rubber Tapes are outstanding among commercial tapes because they are backed by the reputation and experience of the Okonite Company, for over half a century a leader in the insulation field. This accounts for such features as longer life, greater tensile strength and adhesiveness, distinctive green cores, and for the Cellophane wrapping sealed around each roll.



HAZARD INSULATED WIRE WORKS

Manufacturers of Insulated Wire and Cable for Electrical Contractors

Division of

THE OKONITE COMPANY

Factories: Wilkes-Barre, Pa. Passaic, N. J.

Lighting Data

A Distribution Curve and Its Use

A distribution curve shows the manner in which a light source or lighting unit emits its light in various directions. Its principle use is for design information and for comparing reflectors for a given service from the standpoint of light

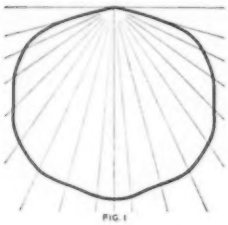


FIG. 1

FIG. 2

distribution and light absorption.

The foregoing curves are presented to show the manner in which light is distributed from an RLM Dome reflector, Fig. 1, and a High Bay unit, Fig. 2. One glance at these widely different distributions, obtainable from typical industrial equipments, suggests the desirability of knowing the manner in which a unit distributes light before recommending it for a specific job.

Show Window Lighting

It has been estimated that 30 to 50 per cent of a store's sales are made through its show windows and their effectiveness is generally proportional to their lighting.

The following table gives the lighting requirements for show windows:

Large Cities	*Foot-Candles*
Brightly Lighted Districts	200
Secondary Business Locations	100
Neighborhood Stores	50
Medium Cities	
Brightly Lighted Districts	100
Neighborhood Stores	50
Small Cities & Towns	50
Lighting to Reduce Daytime Window Reflections	200-1,000

To figure the watts per running foot necessary for a given window, the following formula may be used.

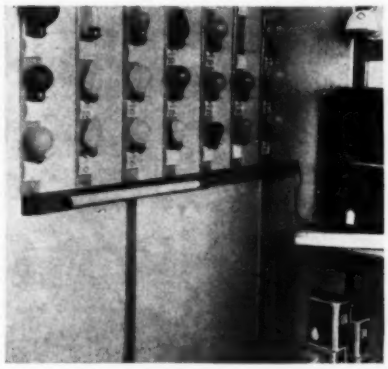
$$\text{Watts per Running Foot} = \frac{\text{Foot candles} \times (H + D)}{7}$$

H = the height of the window and D the depth.

As an example, assume a neighborhood store in a medium size city, having a show window 6 ft. high and 4 ft. deep. Applying the formula, the watts per running foot would be $\frac{50 \times 10}{7}$ or 71 watts, which means that the window should be equipped with 75 watts on 12-in. centers or 100 watt lamps on 16-in. centers to obtain approximately 50 f.c. of illumination.

Mounting Lumiline Demonstration Sets

Since lumiline lamps have proven their possibilities for various novel lighting effects, the Lang Electric Company, Orlando, Fla., makes it easy for customers to look at sample units. Two units were mounted in a horizontal and permanent position directly beneath a neat lamp display rack. A convenient tumbler switch at the farther end permits the sales



clerk to light this demonstration unit. A portable lumiline assembly as shown on the table, was also made up with a length of cord.

Relation of Paint to Good Lighting

By Dean M. Warren
General Electric Company
Nela Park Engineering Dept.
Cleveland, O.

No matter how carefully designed a lighting system may be as to type and size of lamps, type and make of reflector, spacing of outlets, or how well maintained, if the surroundings are not adapted to reflecting a good percentage of the light striking them, an inefficient system is bound to result. Frequent painting and a good maintenance schedule keep the lighting system "running smoothly."

In an average size factory room having a ceiling and sidewalls with reflection factors of 30 per cent and 10 per cent respectively, which condition is quite common, repainting the ceiling to reflect 70 per cent and the sidewalls 50 per cent will increase the level of illumination on the work approximately 15 per cent.

In an office where similar conditions might exist, repainting to secure 70 per cent and 50 per cent reflection from ceiling and walls will increase the level of illumination about 50 per cent if enclosing globe units are used and about 180 per cent if indirect units are used. These values decline as paint ages.

The question naturally asks itself as to the loss in dollars and cents due to paint depreciation. To analyze the problem let us assume a machine shop having a floor area of 2,500 sq.ft. upon which 17 f.c. are delivered from a direct lighting system using twenty-five 300-watt lamps. In the shop, the newly finished walls and ceiling have a reflection factor of 70 per cent and 30 per cent respectively. Here is also a well-established maintenance system which calls for a careful cleaning of the reflectors every three weeks, the replacement of burned out

WHAT HE SAYS CAN HELP CONTRACTORS LAND MORE FLOODLIGHTING JOBS NOW

When players single out Benjamin "Play-Area" floodlighting as the kind they prefer to play under . . . that's good news for Contractors who are looking for new opportunities to make money this Spring.

The Softball season is here. This year's outlook points to more fields to be lighted than ever before. And with a record of more than 250 floodlighted fields from coast to coast, the swing is definitely to Benjamin.

Begin now to get ready for this profitable business by contacting team officials and civic groups in your community who are interested in the game. And send today for the new Benjamin Sports Lighting Data Books, illustrated at the left, which contain all the information you need to sell, make lighting layouts, render estimates and install Softball, as well as dozens of other sports floodlighting jobs.

MAIL COUPON FOR SPORT LIGHTING MANUALS

BENJAMIN ELECTRIC MFG. COMPANY
DEPT. EC, DES PLAINES, ILLINOIS

Please send me the FREE Sport Lighting Data Books to help me get Softball Floodlighting jobs.

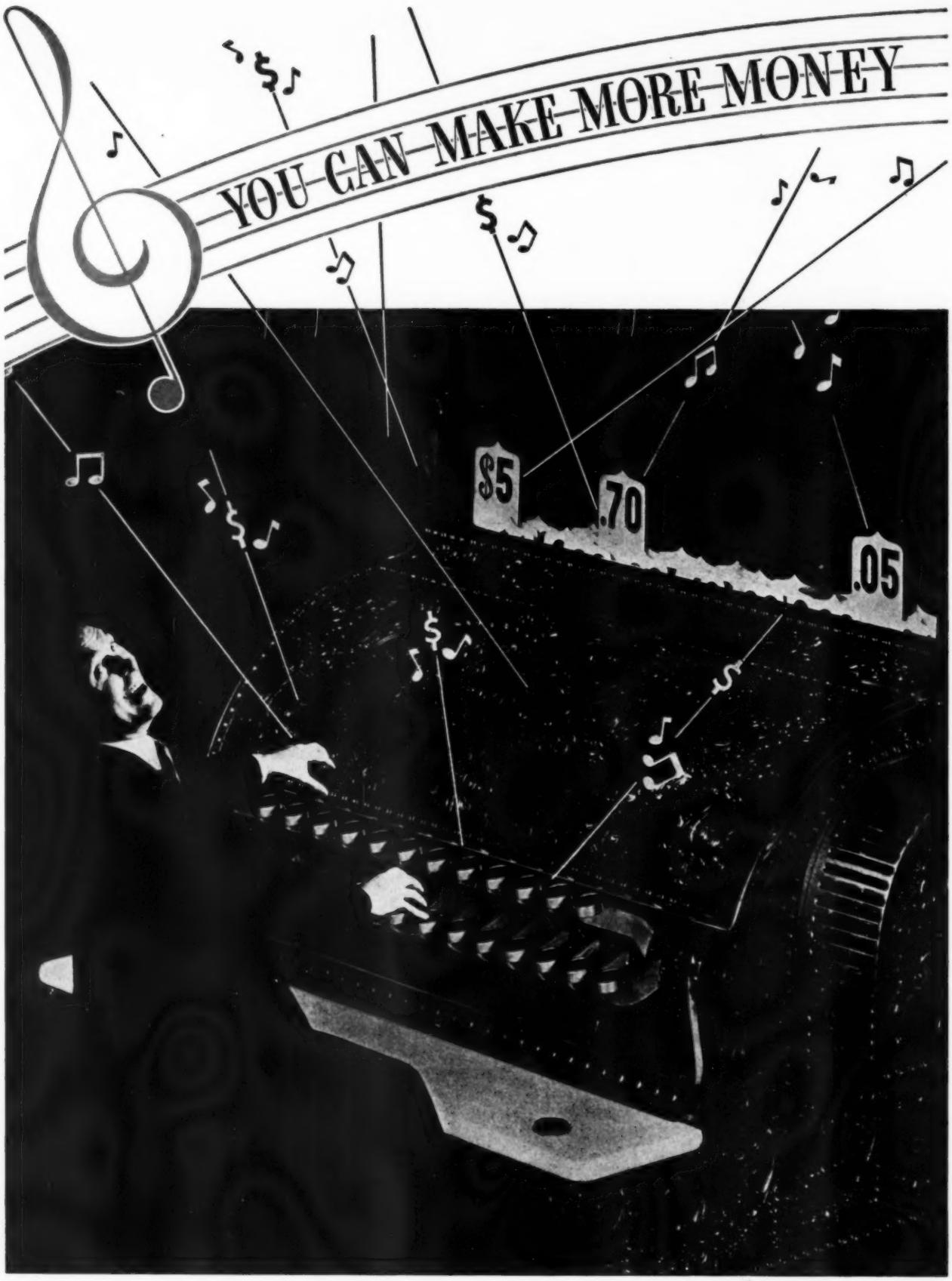
NAME .....

FIRM .....

ADDRESS .....

CITY ..... STATE .....

BENJAMIN
TRADE MARK


YOU CAN MAKE MORE MONEY
$5
.70
.05

INSTALLING GENUINE ELECTRUNITE Steeltubes

REG. U. S. PATENT OFFICE

ELECTRICALLY • WELDED •

• The sweetest music in business is the song of the cash register. Whether the song is pianissimo or crescendo depends on the products you sell.

Business is on the upgrade. Industrial plants are expanding and remodeling. Homes are being built. Public money is being spent for new buildings. All require electric wiring. All can be sold ELECTRUNITE Steeltubes—to your advantage.

This modern electric resistance welded electrical metallic tubing is easy to install—light in weight, easy to cut and bend, requires no threading, only three simple fittings required for any job. It is easily adapted to existing threaded conduit installations. It affords adequate electrical and mechanical protection. It makes wire pulling approximately 30 per cent easier. With all necessary fittings, it costs less than threaded conduit. And it has been given wide approval for all types of buildings.

You can make more money—if you use genuine ELECTRUNITE Steeltubes. Ask your electrical wholesaler for figures, see Sweet's Catalog or write us for information.

Patent No. 1,962,876
Knurled inside finish available in ½", ¾" and 1" sizes

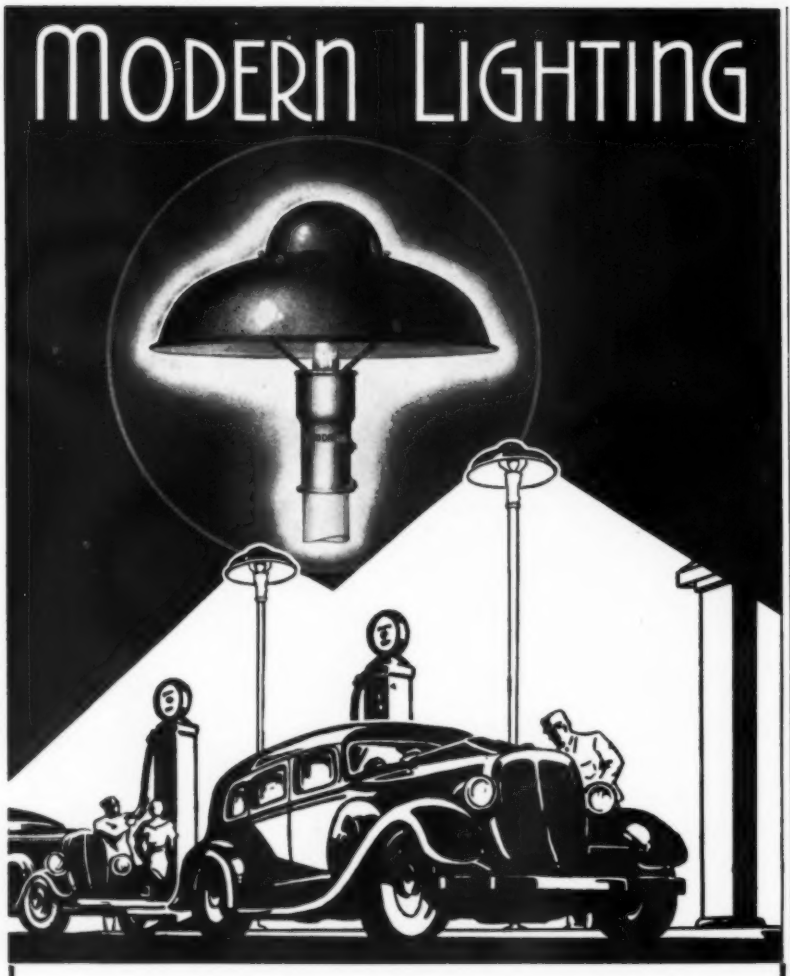
Electrical Division

Steel and Tubes *Inc.*

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING

CLEVELAND . . . OHIO

SUBSIDIARY OF REPUBLIC STEEL CORPORATION



MODERNIZE FOR PROFITS
WITH GOODRICH STAND-LIGHTS

GOODRICH STAND-LIGHTS ARE THE SIMPLEST AND MOST ECONOMICAL MEANS OF MODERNIZING THE GASOLINE SERVICE STATION. OLD STYLE STATIONS PAY FOR GOOD ILLUMINATION WHETHER THEY GET IT OR NOT. LET US HELP YOU MODERNIZE YOUR WAY TO GREATER PROFITS.

WRITE FOR CATALOG 61

GOODRICH
ELECTRIC COMPANY

GENERAL OFFICES & FACTORY — 2901-35 NORTH OAKLEY AVENUE, CHICAGO
OFFICES IN ALL PRINCIPAL CITIES

lamps, and the maintenance of proper voltage at the lamps, yet in spite of all this well planned maintenance system the illumination drops from 17 f.c. to around 14 f.c. in about three years time.

If energy costs 2.5 cents a kw.-hr., the operation of this machine shop lighting system costs 18¾ cents per hour. With an average loss of 1.5 f.c. over the three year period, the cost of this lost light would be equal to 9 per cent of 18¾ cents or 1.5 cents an hour. Assuming the lighting units are used half the time, this would mean a yearly loss of about $15.60. In a three year period this light loss amounts to $46.80 which is about ⅓ of the cost of repainting or ⅜ of the cost of spraying.

Repainting is obviously justified from an economic point of view every few years. However, it cannot be placed entirely on a dollars and cents basis. Environment plays such an important part in the productive usefulness of the employee that repainting should really be done whenever the interior appears dirty. Clean, bright surroundings are to the worker, what the coming spring is to all of us—a cheerful sight.

The following table gives the reflection factors of colored surfaces.

White	81%
Canary	68-72%
Cream	61-66%
Buff	56-62%
Gray	46-50%
Light Green	39-67%
Dark Green	7-22%
Light Blue	39-65%
Dark Brown ...	9%
Red	20%
Dark Blue	7%

The Sodium Vapor Lamp

Because the sodium vapor lamp is a comparative newcomer to the field of lighting, the following remarks answer some of the more or less technical questions concerning the lamp.

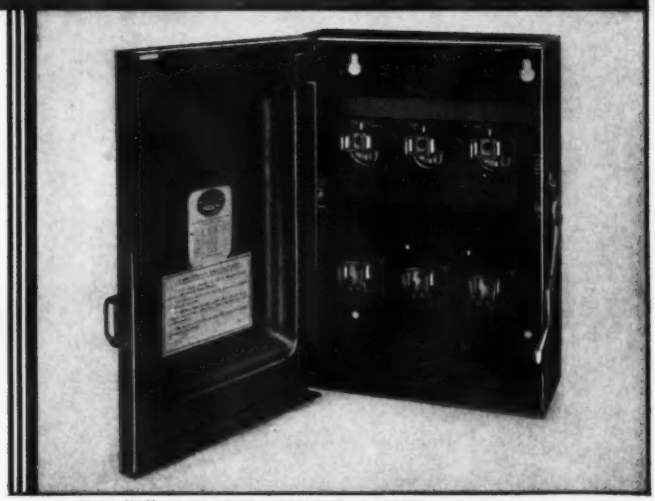
Q. What is the efficiency of the sodium vapor lamp?

A. The efficiency today is between 40 and 50 lumens per watt. The lamps used on the Balltown Road highway installation give approximately 50 lumens per watt. Lamps of over 70 lumens per watt have been produced in the laboratory, while much higher efficiencies are theoretically possible.

Q. Why is it possible to obtain such high efficiencies?

When you NEED a fuse link

or a 1200 AMPERE SAFETY SWITCH!



TYPE "C" COLT-NOARK DUALBREAK SAFETY SWITCH — 575 VOLTS

You'll find them Both in the New COLT-NOARK LINE

There's a big advantage in being able to furnish your customer with a complete line — everything from a fuse link to a 1200 ampere Safety Switch — all bearing the same nationally known trade-mark — all backed by an organization that has been producing products of outstanding efficiency — for exactly 100 years. The new Colt-Noark line includes Type A, C and D Safety Switches . . . Weather-proof Safety Switches . . . Meter and Service Entrance Switches . . . Service Equipment . . . Motor Starting Equipment ranging from Push Button Stations up to Combination Motor Starters and Safety Switches . . . Fuses and Fuse Accessories . . . Cast Iron Service and Fuse Boxes . . . and the New Protectit Auxiliary Circuit Breaker.

What a line — what an opportunity for you to increase your profits by stocking just one line — a line that is well known . . . well advertised . . . well serviced!

CATALOG 58-S

Send for your copy of Colt-Noark catalog 58-S. Contains descriptions and specifications of Safety Switches, Meter Service and Entrance Switches and Motor Starting Equipment. Ask for a copy.

COLT'S PATENT FIRE ARMS MFG. CO., ELECTRICAL DIVISION HARTFORD, CONN.

Boston, New York, Chicago and Philadelphia. H. B. Squires Co., Pacific Coast Representative

1836 COLT 1936

COLT-NOARK

SWITCHES - MOTOR STARTERS - FUSES

100 Years of Manufacturing Experience is back of Every Colt Built Product

GO OUTDOORS
. . . *for profits!*

THIS SIGHT-CRAFT UTILITY LIGHT is an inexpensive and effective unit for outdoor lighting

Lighting adds to outdoor pleasures. There's a real market and a real profit in yard lighting—residential or industrial. This rigidly constructed unit has heavy cadmium plated hinged swivel type mounting bracket. Reflector is finished in everlasting VITROLUX (fired on at 1500° F)—green inside, white outside—wired with 4' all rubber cord and plug. Many uses.

ORDER SAMPLE UNITS FOR DISPLAY

SMOOT-HOLMAN CO. (address nearest office) DATE .....

Enter our order No. ..... for following portable UTILITY LIGHTS.

Quantity	Cat. No. & Description	*Wattage*	*List**	*Weight*
.....	2008— 8" UTILITY LIGHT	75-100	$3.20	5 lbs.
.....	2010—10" UTILITY LIGHT	150-200	3.60	7 lbs.

*DISCOUNT 40%
List price is f.o.b. Whses. Freight allowed to dest. on orders 100 lb. or more.

SHIP TO .....
ADDRESS .....
MY JOBBER IS.....

SMOOT-HOLMAN COMPANY
SIGHT-CRAFT
INGLEWOOD CALIFORNIA
MADE IN U.S.A.

SMOOT-HOLMAN COMPANY
INGLEWOOD, CALIFORNIA

SAN FRANCISCO
154 Eighth Street

NEW YORK
10 Jones Street

SEATTLE
532 First Ave. So.

A. It is the peculiar property of sodium vapor that practically all its radiation is of the wave lengths to which our eyes are highly sensitive, and almost no energy is wasted in invisible radiations.

Q. What is the color of the light?

A. The light emitted from the lamp is a golden yellow and contains no other colors. It is approximately the color of the flame produced when common salt is dropped into a flame.

Q. What are the advantages or disadvantages of this light?

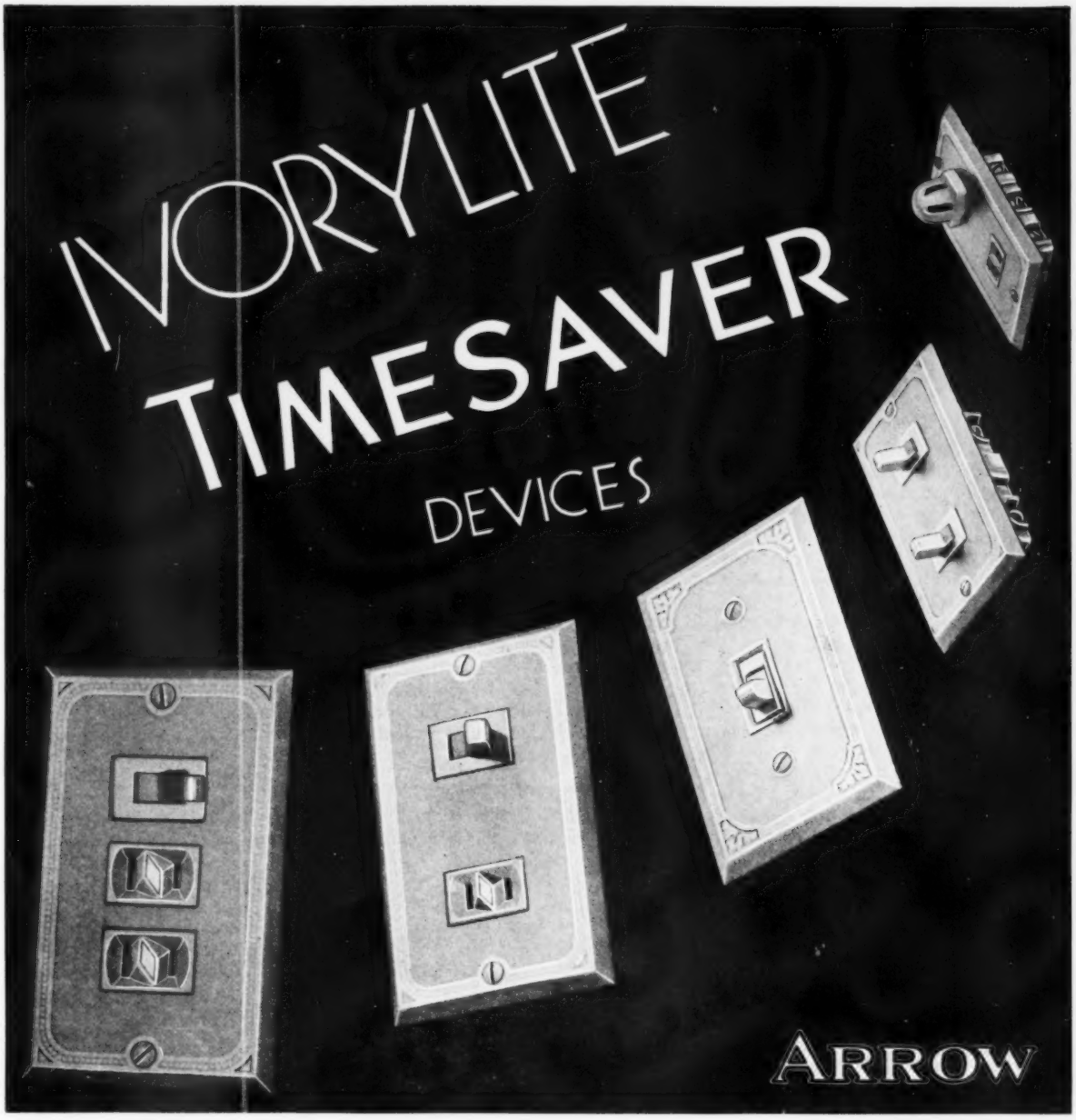
A. The outstanding advantage is the large amount of light obtainable for a given expenditure of electricity, surpassing in this respect any other illuminant now practicable. This is partly counteracted by complication and cost of equipment, and the fact that the lamps do not come to full light output immediately. The peculiar color of the light adapts it especially for certain special applications but bars it from the places where artistic appearance is desirable. The colors of many objects are distorted under the light, and given an unusual appearance. As has been shown by the research of Luckiesh and Moss, the light has a further advantage in revealing fine detail such as fine print and lacework. This advantage has, however, been exaggerated by some writers and extended to seeing in which visual acuity does not apply. Reid and Chanon in their experiments on the fundamentals of highway lighting found no measurable variation in discernment for safe driving with equal values of illumination from sodium vapor, mercury vapor and Mazda lamps.

Q. In what field does the lamp have its widest application?

A. The vast majority of installations so far made are for highways, bridges, tunnels and secondary streets. The engineers both here and abroad view these as the most promising fields. The light has also been used for certain spectacular effects and for floodlighting suitably colored buildings, monuments and advertising boards. The laboratory scientist finds the monochromatic light quite useful for polarization effects and special measurements.

Q. Is sodium light better for fog penetration than other sources?

A. Despite popular impression all authoritative tests indicate that neither sodium, neon, or any other colored light has any advantage over incandescent light, so long as the initial candlepower or lumens are equal. All colors of light are absorbed in approximately equal proportions by fog and smoke.



Switches, Receptacles, Pilot Light Combinations and Plates—all now available in rich IVORYLITE. This cream-tinted, white moulded material is ivory-like in appearance and of solid color throughout. It is *not a finish* and will not chip, flake or wear off. When soiled it is easily cleaned with a damp cloth. Plates have attractive borders, with ribbed surface.

IVORYLITE *Timesaver Line* is complete in every required arrangement of switches, single or in combination with receptacles and pilot lights. Mechanisms are fully enclosed in compact IVORYLITE bases, making dust-and dirt-proof units. Each combination comes *assembled in one base,* ready to install. Catalog sheet—on request—brings complete data.

ARROW ELECTRIC DIVISION
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Code Chats . . . . .

Questions and answers relating to the interpretation of the National Electrical Code . . .

Conducted by F. N. M. Squires

Chief Inspector New York Board of Fire Underwriters

Ungrounded Switch Box

Why does 1202-f refer only to snap switches of the flush wall type? Why doesn't it include tumbler or push-button flush wall type as well? I thought snap switches were considered just a rotary type of switch. It seems that if the rule just stated flush type switches, it would include all flush types.

This is really an exception to rule 1202-d which requires the grounding of metallic switch enclosures. This rule, then, permits the enclosing box to be not grounded when it is installed inside of a wall, so that the cover will be flush with the wall providing the cover is of a non-conducting material. If the box protruded from the wall or was surface mounted then it would have to be grounded.

Snap switches are those in which the action is augmented with a spring so as to effect a quick make and break. They include the rotary, push, toggle, tumbler, etc., types. The term "snap" is to differentiate the type from "knife" type which is of slow action.

Number of Wires Allowed in Protective Conduit

Section 501 states that "Where open conductors cross ceiling joists and wall studs and are exposed to mechanical injury they shall be protected by one of the following methods . . . . by conduit in which case the rules for conduit shall be followed. . . ."

Under Section 503, the following statement is made: "The following tables (Tables 1, 2, 3, 4, 5, 6, 7 and 8) apply only to complete conduit systems, and do not apply to short sections of conduit used for the protection of exposed wiring from mechanical injury."

Now, in the event that a 3-ft. piece of conduit were used to protect a given number of conductors in an exposed wiring system, would Table 1 govern the size of the conduit required?

The Tables 1 to 4 inclusive, of 503-j, are based on the presumption that the conduit run may be of a considerable number of feet and have up to four quarter bends. The permissible exceptions to Table 2 immediately following Table 1, show that consideration is given to smaller limited lengths of conduit and less bend. It is to be expected, therefore, that for a very short length of conduit with no bends, practically as many wires as will fit easily into the short piece may be so run.

CONDUCTS JOB LAYOUT INSPECTION PLAN: Applications that are filed with the city electrical inspection department at Jacksonville, Fla., must be accompanied by a sketch of the job that is covered by and described in, the application for inspection. Jobs for which regular blue prints are not available may be drawn in pencil on 8½-in. by 11-in. or larger paper, and must indicate all outlets, switches, panelboards, feeders, and other important electrical details. In addition these layouts, which are not required to be drawn to an exact scale, must give the correct floor areas of such spaces as are being wired. W. A. Stall, chief electrical inspector, and a former electrical contractor in Jacksonville, reports this procedure as being a helpful means of "nipping in the bud" before work commences, many cases of misunderstanding as to compliance with the local electrical ordinances. Also this plan-with-application method provides the field inspectors with definite layouts of where to find additional installed work, and gives them a quick check against the permit fees that were paid.

Conducting Dusts

Rule 3203-d states: "The conduit boxes and fittings used in locations where dusts are of an electrical conducting nature, shall be of the dust-tight type."

How can you tell when a dust is of an electrical conducting nature? That is, what kind of dusts would be considered of an electrical conducting nature?

Dusts of metallic substances are conducting. Some other dusts also will conduct electricity, for instance, carbon dust. Many dusts while dry are non-conducting but when moist become quite good conductors of eiectricity.

Sockets of Low Capacity

What are "sockets of low capacity"?

Sockets are rated at 250-watts and at 660-watts capacity. The 250-watt size are, therefore, the ones of low capacity.

Apartment House Stairways

In figuring feeder sizes for an apartment house should the area of the hallways be added to the area of the living quarters?

The public hallways and stairways of an apartment building have a definite lighting load which is turned on in its entirety each evening.

Therefore, in figuring feeder sizes for such cases the area of the living quarters should be employed and the wattage load computed from this according to rule 2002 and then to this should be added the full definite load of the hallways.

Motor Tables for Elevator Motors

Do I have to use the motor tables of Rule 808 for elevator motors?

Freight and passenger elevator motors are classed as being of intermittent duty instead of continuous duty and are governed by rule 809-a rather than 808. According to 808 continuous duty motors must have branch circuit conductors at 125 per cent of the rating of the motor and on this percentage are based the motor tables.

But intermittent duty motors may have branch circuit conductors at 85 per cent, 90 per cent or 100 per cent according to the time rating of the motor.

For instance a motor having a 15 minute rating and used for a passen-

A bank of 15 Type "A" Safety Switches 30 to 600 Amp. for both light and power distribution.

The switches are fed from "Step Type" BUSS-WA, an enclosed bus arrangement.

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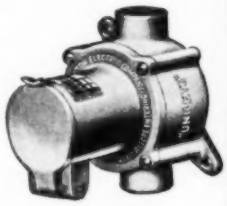
Type "CEST" Explosion-Proof Receptacle Equipment Complete with Type "CPH" Plug



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Type "EFSC" Motor Control Push Button Station

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Explosion-Proof

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ger elevator may have the circuit conductors rated at but 85 per cent of the name plate rating of the motor.

Also the protective devices for the circuit conductors selected in accordance with Table 6 of 808 are considered as sufficient protection for the motor.

Length of Flexible Cord

What may be the length of flexible cord from lamp or appliance to electrical outlet?

There is no set maximum length for portable cords attached to portable lamps and appliances. The cords should be only of such lengths as to reach from the receptacle to the device without having to be placed where they will be subject to being walked upon, rocked on, run under rugs or carpets, or where they may be injured by chair, table, bureau or bed legs. Many fires have been occasioned by cords which have been frayed or abraided through contact with such objects. Generally, however, 6 to 8 ft. of cord is considered as the limit, although slightly longer is sometimes permitted

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Wood on Signs

Section 3805a states that wood may be used for the external decoration of signs if kept at least 2 in. from the nearest lamp holder.

Does this mean for neon signs as well as incandescent lamp type? In the first sentence of this rule it states, "except for signs of the indoor portable type all signs shall be constructed of metal," so I should think this includes neon signs."

Rules 3801, 3802, 3803, 3804 and 3805 refer to all types of signs whether incandescent or neon. Rules 3806 and 3807 from the nature of the subjects refer to incandescent lamp signs.

Rules 3808, 3809, 3810, 3811, 3812 and 3813, again from the nature of the subjects covered, refer to the neon type signs.

I have in a school that is wired with cleat receptacles, a wood sign 2 ft. by 8 ft. which is used for practice work for wiring to a flasher.

According to this rule should it be made of metal? It is a fixed sign.

If installed in the field the sign would not be permitted if constructed of wood. As the one referred to, although used for school practice work, represents a model of an approved sign, it should be constructed according to Code requirements.

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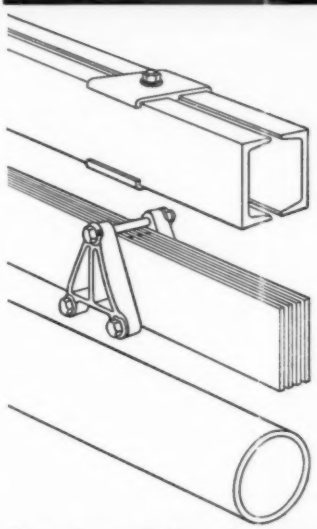
best for Plating Jobs



Three forms of Alcoa Aluminum Bus: Channeluminum for very heavy loads; flats and tubes to meet performance and layout requirements.

Plating Room installations are tough — but not for Alcoa Aluminum.

Nature made Aluminum highly resistant to the fumes ordinarily present in this class of installation. In the job illustrated, the Alcoa Aluminum Bus is subject to sulphuric acid fumes, cyanide fumes, and cadmium oxide fumes. Work done in this room includes zinc, copper, brass, and cadmium plating.

Ability to withstand corrosive attack is a characteristic of Alcoa Aluminum which is all-important in plating- or battery-room installations. In addition (and this applies to all work) Alcoa Aluminum Bus is more economical because supports may be lighter, and because every part of the erection operation is easier, quicker, and therefore, cheaper. The complete story is too long to tell here. Ask us for all the facts. Address ALUMINUM COMPANY OF AMERICA, 2197 Gulf Building, Pittsburgh, Pa.

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ELECTRICAL CONTRACTING

S. B. WILLIAMS, Editor

State Laws

WHEN it became apparent that a wide-spread farm electrification program with government backing was coming, the farm insurance interests of Michigan promoted and succeeded in securing a state electrical licensing and inspection law to prevent the installation of unsafe farm wiring. Now the Wisconsin contractors are finding that farm wiring in that state is not all that it should be, and they are striving for a state law to regulate wiring.

How long will it be before other states find out that although the government may be financing the construction of high lines, there is no supervision of the wiring of the actual farms?

A model state law has been developed by NEMA which has a department set up to give local interests assistance in drafting suitable bills. It should be obvious that if farm electrification is to be wide-spread, as it undoubtedly is, there must be some kind of regulation. There is no reason for local electrical interests to try to do their own drafting unaided when expert help is available for the asking.

Material Prices

ORDINARILY one would suppose that a price war among wiring materials manufacturers would be pleasantly received by electrical contractors. As a matter of fact the only ones to benefit are those who have work on contract and are able to buy at prices lower than they had estimated. In some cases it may be the difference between red and black ink on a closely bid job.

To the other contractors it simply means further opportunity to reduce their bids and establish further market instability. In some instances it gives the gambling type of contractor courage to bid low in the conviction that he can squeeze the manufacturer further.

In addition price wars frequently have the effect of lowering product quality. When prices get below the cost to produce manufacturers may retire from the market, or take a loss, or try to skimp on the product enough to at least break even.

Do the manufacturers who engage in the latter practice realize to what extent they are playing into the hands of the advocates of cheaper wiring materials? Here are standards that the industry has for years built up. Surely they must be too high if the manufacturers themselves will cut below them to meet competition.

The lesson of the cord manufacturers ought to be longer remembered. They cut each below the other until the market was in a disgraceful disorganized condition. When the product could not pass inspection, labeling was abandoned. Now these manufacturers are again working under standards and profitably.

Price stabilization with ordinary supply and demand fluctuation is better for the contractor in the long run no matter how much protection he might receive.

Let's Know the Facts

WHAT will be the lesson to our industry as a result of the recent floods? Shall we become enriched with new facts about product performance or will the same confusion of opinions confront us when the next one comes? Veteran inspectors and contractors alike have been faced with making costly decisions under the strain of emergency conditions regarding the salvagability of damaged wiring and equipments. With lives at stake because of shock hazards, and with the possibility of fires and costly system breakdowns later on, there was only one recourse. Many thousands of dollars of material was ordered abandoned.

But the lack of facts about water-soaked electrical materials is regrettable. No doubt many miles of safely insulated conductors were removed for want of time to identify them beyond all doubt. After all, inspectors and contractors could not assume or guess at safety factors. The public's life and property were at stake. Therefore a

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broad view of the situation will vindicate those who made decisions on the safe side. There was no time for borderline chance-taking.

It is one thing to remove water-soaked equipment to baking ovens and quite another to foretell the life of water-soaked insulation that is concealed in flooded structures. A panelboard, a safety switch, or a fuse cutout can be disassembled so it may be thoroughly dried and cleaned of foreign corroding substance. But apparently no one now knows, and few will ever know to what extent deterioration takes place within the insulation assemblies of aged conductors that served flooded buildings.

It is true that some materials were ordered abandoned on rather a wholesale scale. And by so doing, those who issued the orders for such action have to a degree "cracked down" on the abandoned type of product. This was done, however, because there was no room for guesswork.

There is, therefore, an industry obligation to learn more about the performance of its products. It is to be hoped that the flood disaster will not swiftly pass from memory as something to be happily forgotten. Rather, an unbiased digest of product performance should become a written record for our future guidance. Let's have more facts in the future.

By-Passing the Trade

ALL studies of cost place the burden for high prices upon the cost of distribution. It would seem, therefore, that anything that costs so much would be highly prized and not be carelessly upset.

Nevertheless, in spite of the cost to set up dealers, agents, wholesalers and all of the other links in the chain of distribution, the manufacturers of electrical supplies and appliances are apparently willing to sacrifice it all just to get an order that they are afraid some other manufacturer might secure.

The motor manufacturers had a reasonable distribution set-up prior to 1920, but they cast it to the winds in a mad competitive scramble for business. Did they get any greater volume or did they just spend more to get a shorter price and all the grief?

Other manufacturers have similarly tried to by-pass the contractor in a bid for the industrial business, and when their agents went direct the wholesaler did likewise. Of course, this took more of the industrial business away from the contractor, but who cared? Had the wholesaler been willing to stand by his customer, the contractor, it might have been possible for them to make the by-passing manufacturer see reason, but when the wholesaler deserted the contractor the latter had to look for better terms elsewhere. Already a large number have found those terms and are now given wholesaler recognition by a great many manufacturers.

And finally even the electric appliance manufacturers are breaking under the strain. It is not uncommon for people to say "Why, nobody ever pays the retail price for electrical things anymore." Look at the price cutting that is going on in refrigerators. The dealer is the one who gets it in the neck.

Yes, the electrical industry that is always so quick to point the finger of shame at the contractor for being a price cutter is guilty of the worst kind of marketing practices. It is so much like the dog who with a bone in his mouth happened to see himself mirrored in a pond of water. In his greed to get the bone from the dog he thought he saw, he opened his mouth and lost his own bone.

Trade Restraint Suit

PREPARATIONS for the trial of local No. 3, I.B.E.W., in the suit brought by NEMA in the United States District Court, charging that the New York market has been closed to non-union manufacturers, are going forward and it is anticipated that hearings will be held before summer.

This news is encouraging because there have been suggestions from different quarters that the differences between the two parties to the suit might be composed out of court. As a general principle understandings arrived at mutually are much to be preferred. There is greater harmony and none of the victor and loser handicaps. In this case, however, it is not so much the New York market as it is the general principle of whether a union can keep goods out of any market. No good will come of evading the issue at this time. It must be decided sooner or later, so why not now?

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N.E.C.A. News..

Material for this department is supplied by the headquarters staff of the

National Electrical Contractors Association

420 Lexington Avenue, New York, N. Y.

President	Vice President	General Manager
E. N. Peak	Louis Kalischer	Laurence W. Davis
1603 West Main St.	17 Bergen St.	420 Lexington Avenue
Marshalltown, Ia.	Brooklyn, N. Y.	New York, N. Y.

Joint N.E.C.A.-I.A.E.I. Committee Meets

A meeting of joint committees of the N.E.C.A. and the International Association of Electrical Inspectors was held at the Lake Shore Athletic Club, Chicago, on April 21, at which plans were discussed for co-operation between the electrical contractors and electrical inspectors for effective administration of the National Electrical Code and local inspection ordinances.

The N.E.C.A. committee consisted of Louis Kalischer, chairman, Brooklyn; George Andrae, Milwaukee; and J. W. Collins, Chicago, and the I.A.E.I. committee was composed of the following inspectors: L. P. Dendel, chairman, Lansing, Mich.; N. E. Canady, Raleigh, N. C.; L. W. Going, Portland, Ore.; W. J. Mahan, New Haven, Conn.; R. H. Manahan, Los Angeles, Cal.

REA Statement Prepared for President Peak

The Rural Electrification Administration at Washington recognized the constructive influence of President Peak's talks in the course of his 6,000-mile western trip on which he is now engaged, and prepared a special statement of the R.E.A. program and policies for his use to be distributed at the meetings in the more than twenty-five cities which he is visiting. Over 6,000 copies of this special statement were prepared by the R.E.A. and forwarded to President Peak at the various cities along his route.

The R.E.A. policies are presented in the following concise statements:

"Specifically, REA lends funds to local organizations to construct new power lines extending into those districts which are without electric service. REA does not give anything away. It is a financing organization that lends money to agencies that are in a position to carry through a power line construction project, rapidly and adequately.

"Loans are made on favorable terms and may be repaid over a 20 year period. The interest rate is very low —only 3 per cent. In most cases the loan will cover the cost of building the main power line including the service lines to the farm homes and the customers' meters.

"REA is willing to work with any eligible group of persons interested in extending power lines. There are no local offices. All correspondence about projects will be with headquarters in Washington.

"However, regardless of the financial aid which REA can give to construct extensions, unless the proposed consumers use good wiring and a sufficient number of load-building appliances, the program will not be successful. To supplement its line building construction, then, REA is prepared to finance proper wiring that will enable farmers to realize the full use of current.

"Here again, in order to take advantage of mass savings, REA will deal with local agencies which can relend its funds for group wiring, with responsible electrical contractors doing the wiring under contract."

ENTHUSIASTIC ASSOCIATION WORKER: A veteran among electrical contractors of Savannah, Ga., Norton Frierson, has kept up hopes of better industry conditions through state association efforts. Mr. Frierson is vice-president of the Georgia Electrical Contractors' Association, and operates a commercial and residential contracting business at Savannah. Several large home remodelling jobs and some new houses have recently been completed by Mr. Frierson.

N.E.C.A. Representatives at Electrical Committee Meeting

The N.E.C.A. was represented at the meeting of the Electrical Committee, N.F.P.A., held in Chicago on April 22 to 24, by the following official members and alternates on the Committee: Allan Coggeshall and Theodore H. Joseph of New York City, George Andrae of Milwaukee and W. L. Fowler of Cedar Rapids, Ia. Mr. Fowler attended this meeting as a substitute in the absence of President Peak, who was on his Pacific Coast trip at the time.

Southern California Interested In Association Program

The following report on the meetings held in Southern California during President Peak's visit to that section while on his Western trip, is typical of the reports from other cities in the Southwest which Mr. Peak has visited and shows the interest and enthusiasm with which our industry is receiving the program that has been undertaken by the National Association:

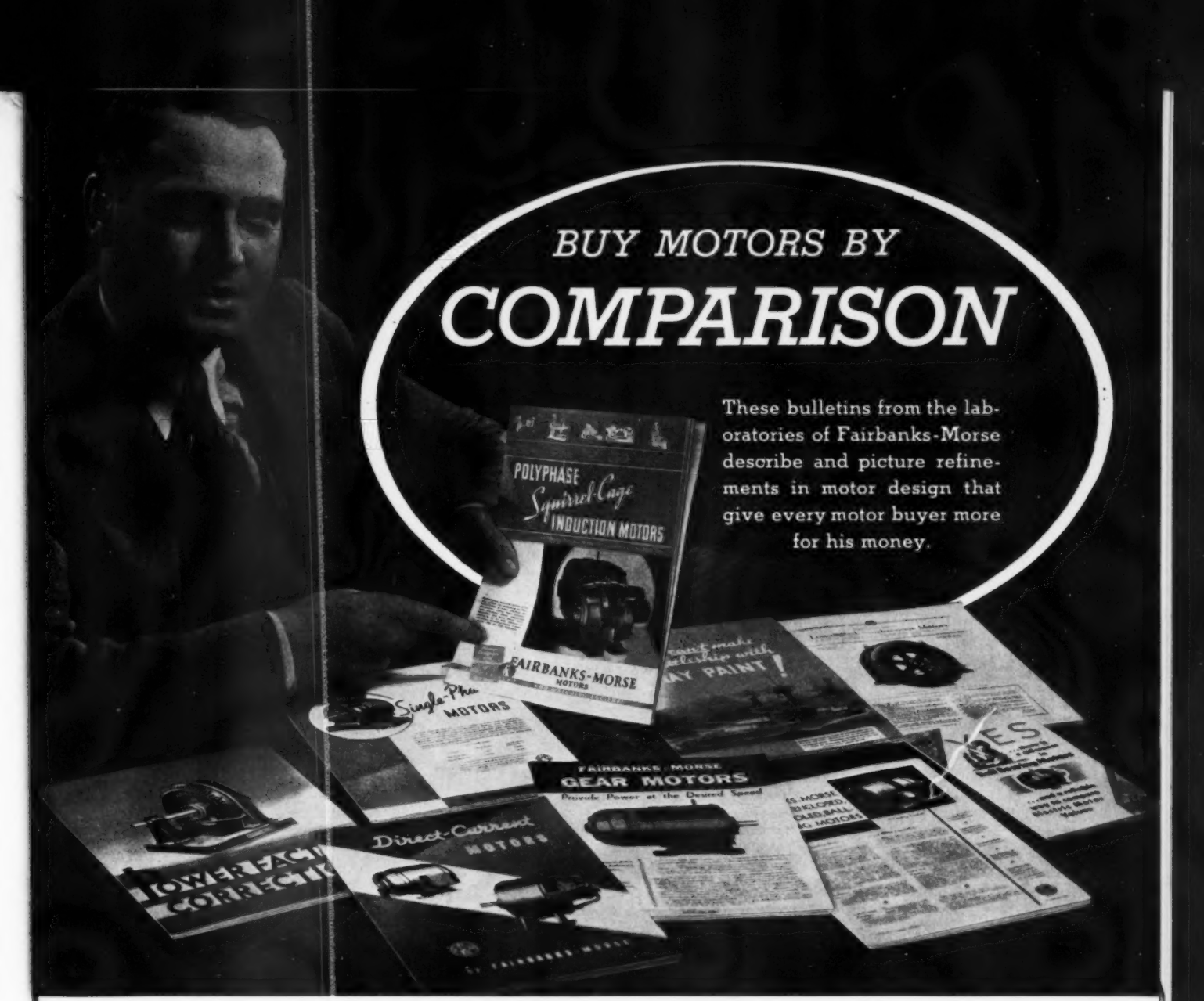
"Opening a four-day contact with representatives of all branches of the electrical industry in the Southern California area, Earl N. Peak, president of the N.E.C.A. addressed the Los Angeles Electric Club on April 20 upon the subject of 'Industry Relations.' The Electric Club meeting was designated 'Contractors' Day' and the program was in charge of officials of the local contractor organization. An attendance of approximately 150 was registered, including executives of all branches of the local electrical industry.

"Mr. Peak emphasized the value to the industry of a large body of contractors operating in accordance with the N.E.C.A. 'Pledge of Cooperation' and the need for full recognition from other industry groups for contractors so operating.

"On April 20 an informal dinner was held at the Los Angeles Athletic Club for a more detailed discussion of the plan of industry coordination and the means to be used for effectively tying in the program of the recently organized Electrical Development League of Southern California with the general outline of the national program. This meeting was attended by more than twenty chief executives of local power companies, wholesalers, manufacturers and contractors who gave a very enthusiastic reception of the principles enunciated by Mr. Peak.

"On April 21 Mr. Peak visited San Diego to make a similar address before the Electric Club of that city to be followed later the same day by meetings with industry officials there and by an evening dinner meeting held by N.E.C.A. members and their contractor guests.

"Returning directly to Los Angeles



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To acquaint you with the design and construction refinements that are built into Fairbanks-Morse motors, we offer to every user and prospective user, every designer and engineer, descriptive bulletins on F-M motors. Clearly pictured in photograph, diagram, and description are fine motors of every type that offer features and construction that should be required in every motor specification.

Your copy of any of these bulletins will be sent on request. Simply indicate the type and service in which you are interested. Address Dept. H421, Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago. 34 branches at your service throughout the United States.

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This bracket, Type J, has a 40 degree vertical adjustment, 20 degrees up and 20 degrees down — plus a horizontal swing of 180 degrees without moving the bracket and only one bolt to tighten. It insures greater flexibility on all jobs.

The season for sports and all other outdoor floodlighting is here. You can make the most of this money making opportunity by selling Quad Floodlights. Quad has a line that incorporates a unit for every type of floodlighting. They're all correctly designed and built of materials that stand up.

The Quad line is a modern one. Put your efforts behind Quad—you'll profit. Send us your sports lighting problems for our recommendations on layouts.

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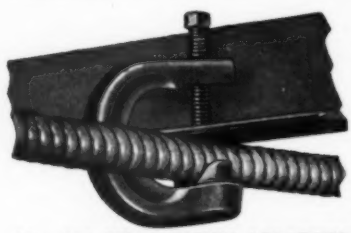
ANNOUNCING

NEW CABLE SUPPORT AND PIPE HANGER



No. 480 "BULL DOG" ARMORED CABLE SUPPORT

A light weight clamp for supporting or hanging armored cable to steel framework. It is made of stamped steel, cadmium plated, with case hardened cup point set screw.

No. 470 PIPE OR CONDUIT HANGER

A strong and durable malleable iron hanger for supporting pipe or conduit to steel framework. It will accommodate sizes of ½", ¾" and 1" pipe to steel beams ⅝" thick.

EXAMINE THESE FEATURES

- Permit hanging cable or conduit from any angle.
- Eliminate necessity of drilling frame-work, saving time, labor and preventing weakening of steel beams by drilling holes through them.
- Easily and quickly installed—especially convenient for changing wiring on temporary or permanent jobs.
- Cheapest and best method of installing armored cable, conduit or pipe in factories, garages or buildings of steel construction.

Write for complete details, prices and literature on these new No. 480 "Bull Dog" armored cable supports and No. 470 pipe or conduit hangers.

FULLMAN MFG. CO., LATROBE PENNA.
MANUFACTURERS OF FLOOR BOXES AND WIRING SPECIALTIES

on April 22, Mr. Peak's entire day was given over to individual contacts with contractors, power company executives and others; and in the evening a dinner meeting of the Southern California Chapter, N.E.C.A., was held at the Hotel Mayfair where he outlined in detail the responsibilities which the contractors must assume if they are to justify the full and proper recognition of their position in the industry.

"Mr. Peak's visit to Southern California was concluded with the trip to Santa Barbara on April 23 where he met with the local industry leaders of Ventura and Santa Barbara Counties to give them a close-up view of the opportunities now open through proper organization and coordination of functions.

"President Peak's visit here has stimulated a renewed interest in the possibilities for local business development. As a result of this, increased activity toward perfection of the local industry organization and particularly in the work of the Southern California Chapter, N.E.C.A., may be confidently expected."

Housing Director Turns Down Contract Separation

In response to a letter addressed to A. R. Clas, director of housing, Federal Emergency Administration of Public Works, requesting that the mechanical and electrical work on a large slum clearance project be separated from the general contract and handled through direct bids for the separate trades, Mr. Clas replied as follows:

"Our investigation does not substantiate the claims that a better class of contractors would be obtained if the Government took separate bids from mechanical and electrical subcontractors, nor does it indicate that any savings could be created by such procedure.

"The question of the general contractor shopping the mechanical and electrical work with the object of obtaining lower prices is strictly the subcontractors' localized problem encountered in each city. The spirit of co-operation and the methods of working together brought about by certain subcontractors' associations in cities such as Washington and Cleveland, have broken up in some instances such procedure and I feel you will agree that the subcontractors in other cities could profit by operating along similar lines without depending upon the Government to work out their problems for them."

This letter emphasizes the need for strong local electrical contractor organizations. Co-operation with the other building trades can be made an effective means for control of bid shopping by general contractors. The so-called "Nashville Plan" has been one of the successful programs for curbing bid shopping. Copies of this plan may be obtained from N.E.C.A. Headquarters.

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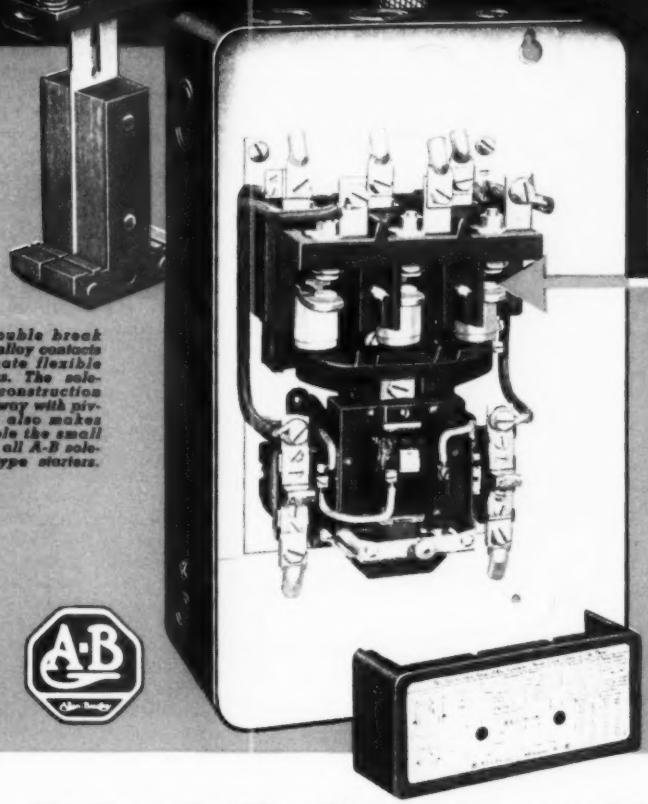
Never Touch *these* SILVER ALLOY CONTACTS

Throw away your file and sandpaper



The double break silver alloy contacts eliminate flexible jumpers. The solenoid construction does away with pivots. It also makes possible the small size of all A-B solenoid type starters.

BULLETIN 709
SOLENOID STARTER
Open view with arc hood removed to show contacts.

Ratings:

Size 1—5 hp, 220 v;
7½ hp, 440-550 v.

Size 2—15 hp, 220 v;
25 hp, 440-550 v.

Size 3—30 hp, 220 v;
50 hp, 440-550 v.

This Starter Has Silver Alloy Contacts —Never Clean, Dress, or File Them!

This extraordinary warning is stamped on the arc hood of every Bulletin 709 starter. Differing from copper contacts, the oxides on silver alloy contacts can cause no trouble. Hence, no contact maintenance is required. The contact life is not filed away by continuous "dressing." Throw away your file and sandpaper when you install Allen-Bradley Bulletin 709 solenoid starters.

There are other outstanding advantages of the Bulletin 709 line. The high current interrupting capacity (currents of ten times the starter's maximum horsepower rating can be easily disrupted) assures reliable performance under the most severe loads.

Terminals are front-connected for easy wiring. No slate panels—no back panel wiring. White cabinet interior helps wiremen in dark corners. Plenty of knockouts for trim conduit connections. Write for Bulletin 709, today.

Allen-Bradley Company
1307 S. First Street, Milwaukee, Wis.

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL

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Contracting .... News .....

Committee on Grounding Research

At a meeting in New York on March 17, 1936, attended by representatives of seventeen organizations, a joint committee, named the American Research Committee on Grounding, was formed to undertake a study of practice and results of grounding of electrical lines, particularly to water and gas pipes. It is expected that organization and procedure of the committee will be similar to those of the American Committee on Electrolysis, which was disbanded in 1935.

The following were elected officers of the committee: H. S. Warren, chairman, representing the telephone group, and Chas. F. Meyerherm, secretary-treasurer representing the American Water Works Association.

REA Farm Wiring Policy

Financing of individual farm wiring jobs will not be undertaken by REA, Morris L. Cooke, federal administrator, stated in a recent letter on REA policy to G. M. Haskell, chairman of the Rural Electrification Committee of NEMA. Wiring installations made on a group basis will be financed by REA through the sponsor organization.

"Even in cases where the wiring is done upon a group basis," Mr. Cooke stated, "it is not contemplated that the work will be done by the agency owning the distribution line. On the contrary, we encourage the employment of local electrical contractors upon the basis of competitive bids."

Policies regarding wiring loans are still very much unsettled. In order to build up an immediate load on new projects REA sees the need for adequate house wiring installations and low-cost financing of appliance sales, but it also sees plenty of possibilities for trouble in these fields. Originally this angle was to be taken care of by Electric Home and Farm Authority, a separate agency, but EHFA is doing nothing and REA is planning to take over at least the house-wiring burden. Appliances are still technically under EHFA; but the new Norris REA bill puts house-wiring under REA. So far no loans of this type have been approved, so the procedure has not yet crystallized, but present indications are that when and if such loans are made they will be made to the sponsoring organization, not to individuals.

The problem of adequate wiring of the farm buildings to enable the farmers to take advantage of the service is still unsolved. A wiring booklet is in preparation but it is doubtful if this will cover much more than the dwelling. A dairy farm just outside of Washington was expected to offer an opportunity for a model wiring job, but it is apparently unsuited to the installation without extensive remodelling to accommodate the various electrical farm equipments.

The statement in last month's issue with respect to REA refusal to finance lines in South Carolina where the contractor furnished labor only, does not set a definite policy. REA will favor a single contract covering both labor and material, but because of the many different kinds of sponsors, it intends to let circumstances alter cases.

Massachusetts Association First Annual Convention

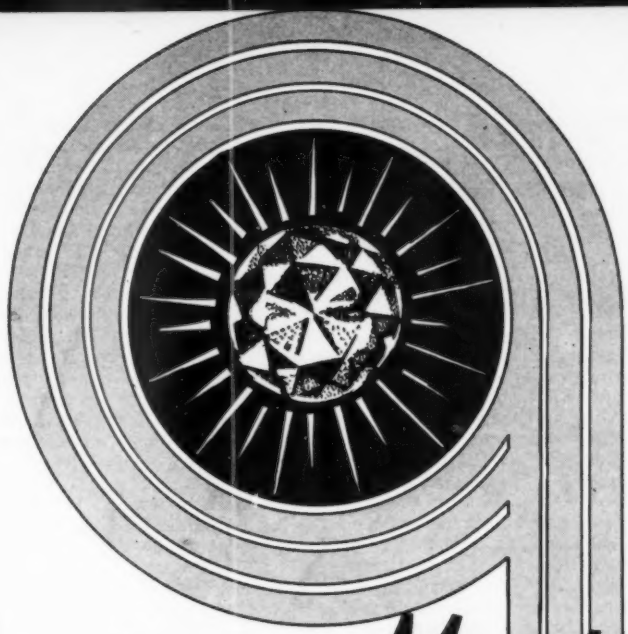
The first annual convention of the Massachusetts State Association of Master Electricians which was held on April 1 and 2 at the Bradford Hotel in Boston began with an evening meeting and election on April 1 at which about 300 members and guests were in attendance. A busy session was conducted on the following day, concluding with a banquet.

In his opening address, Joseph L. Winn, incoming president of the association, stressed the accomplishments of his group and predicted better business relationships, the encouragement of higher types of workmanship and material usage, and the opinion that the state movement was on solid ground. L. H. Barrowclough, who was reelected secretary, stated that local associations representing fifteen communities or districts in eastern Massachusetts, and comprising about 400 members, are now in the state group, while other groups are ready to come in as further organization effort can be undertaken.

Mr. Barrowclough cited the 1935 accomplishments of the association to have covered: (1) Improved trade conditions with wholesalers regarding fixture discounts, (2) adjustments of wholesaler policies through arbitration committees, (3) discussions on legislative matters, and also on new materials that have been placed on the market, (4) adoption of a state association emblem, and its reproduction as a coat lapel emblem by certain local associations for its members, (5) meetings with inspectors in the interest of uniform requirements and code interpretations, (6) social activities, including a successful outing.

V. C. Bruce Wetmore, representing the wholesalers' group, addressed the convention on wholesaler trade policies. Mr. Wetmore named the specific classes of customers, in addition to the electrical contractor, who should be taken for granted as wholesale buyers in determining equitable distribution policies. He further expressed the belief that proper state legislation would

Banquet which concluded two-day convention



Precision Made
FROM START TO FINISH

SANGAMO

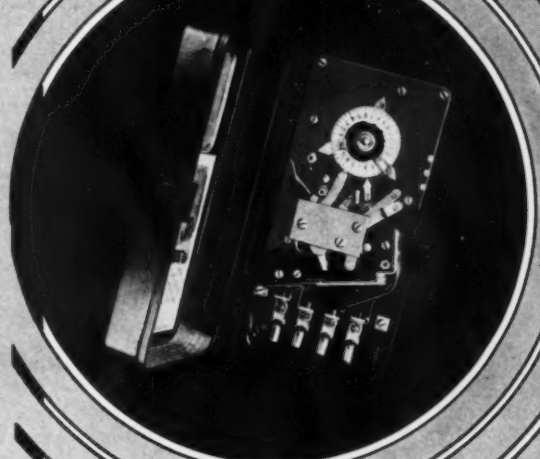
THE organization that manufactures Sangamo Time Switches is trained to quality. Materials of only the finest grades are selected as worthy to enter Sangamo products.

But it is to the precision manufacturing methods used to build them and to the Sangamo standards of accuracy, that these Time Switches lay their real claim to fame.

Built by an organization where the highest grade of workmanship is the rule rather than the exception—in a factory where precision is a tradition of long standing—they richly deserve their reputation for accuracy and quality.

Because of this quality of materials and workmanship, Sangamo Time Switches can be depended upon for faithful, efficient, accurate performance at all times in any weather. The Sangamo reputation for fine clock mechanism and accurate electrical assembly for over 30 years is back of every instrument built by Sangamo.

They require a minimum of service, assuring a full measure of profit on each installation. Sell Sangamos for customer satisfaction and a full profit margin undissipated by excessive service requirements.



A glimpse at the inside reveals the secret of Sangamo's dependability—notice the compact and sturdy mechanism—it's a precision made instrument built to do an exact and accurate job.

SANGAMO ELECTRIC COMPANY **SPRINGFIELD, ILLINOIS**

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prove most helpful to further progress in the association, and predicted the full cooperation of local wholesalers in securing better legislation.

New offices: Joseph L. Winn, president, center, L. H. Barrowclough, secretary, right, Wm. H. Hughes, treasurer, left.

The promotional work of various power companies in the association's trade area was explained by J. J. Caddigan of the Edison Electrical Illuminating Company of Boston. Over $100,000 was said to have been paid by the company to Boston contractors in 1935 for range wiring.

George E. Lydstone, representing I.A.E.I., expressed the inspector's view on the local adoption of changes in code rules, and he also pointed to the need for civil service laws that would stabilize the inspector's position. Mr. Lydstone asked that manufacturers be encouraged to tag or label appliances so as to inform the buyer of the need for safe, convenient and permanently installed outlets from which to operate such new appliances.

Other interesting addresses included the official welcome by Joseph E. Curley, lieutenant-governor; a discussion of overhead, with various problems illustrated on lantern slides by William A. Bradford, publisher of a price book for the plumbing trade; "Business Development in the Electrical Industry" by O. C. Small of N.E.M.A.; Albert Frank, a member of the Massachusetts State Board of Examiners of Electricians, on "Why an Electrical Contractor Should Belong to an Association, and What Benefits He Should Expect to Receive"; "New Current Carrying Values for Wire and Cables Operated at Various Ambient Temperatures, and for Various Periods of Use" were discussed by S. J. Rosch, cable engineer, Anaconda Wire & Cable Company; and "Unity in the Industry from Wholesaler's Standpoint" by Almon Foster, managing director, Northeastern Electrical Wholesalers Association. In addition, engineers and specialists of several manufacturers explained motors and controls, what air conditioning means to electrical contractors, radial wiring systems, vapor lamps, and mercury lighting equipment.

Other state association officers were elected as follows: Wm. H. Hughes, treasurer; B. L. Whittemore, James Ross, Past-president J. J. Reddington, and J. Harvey Lamoureux, vice-presidents.

Code Form Revision Accepted

Formal acceptance of a proposed revision in form of the National Electrical Code was unanimously adopted in principle by the Electrical Committee, N.F.P.A. at its meeting in Chicago, Ill., on April 22 and 23. The 1936 Code will not be affected by this action, as the details of revision are scheduled for completion to appear in the 1937 edition.

This action is a culmination of the work of a committee that was headed by Dr. M. G. Lloyd, of the Bureau of Standards. Its recommended form of revision had been circulated throughout the industry for comment. The various article committees will now continue the final details of revision under Electrical Committee procedure.

Louisville League Adopts Commercial Program

From a previous policy of sponsoring only social gatherings, the Electrical League of Louisville, Ky., has this year evolved to a plan of industry coordination. Each of nine industry divisions has delegated its president to comprise a board of directors, who in turn have chosen C. S. Powell, manager of the local Graybar house, as league president. The nine groups represented in the league are: Electrical Clearing House of Louisville, Inc., Electrical Contractors Association (N.E.C.A. Chapter), Master Electricians Association, composed of about 20 independent contractors, electrical wholesalers, refrigeration dealers, radio dealers, electrical manufacturers and agents, public utility companies, and, architects and electrical engineers. Bimonthly directors' meetings are being held, where matters of business interesting two or more groups may be presented.

The league's initial effort under the commercial-interest program is to put on an industrial exposition, and also to present at the close of the year a distinguished service award to some local member of the industry as recognition for outstanding industry achievement during 1936.

A CONTRACTOR'S INDUSTRIAL SALESMEN: To carry on his sales effort among the industrial accounts of the Nashville, Tenn., area, G. C. Solomon of the Hill Electric Co., made up a sales data binder comprising items of particular interest to his trade. Because the company specializes in industrial contracting and service shop work, Mr. Solomon selected from reputable lines such bulletins or catalogues as would give him complete sales and reference data on: Lighting, panels and switches, motors and controls, belts and pulleys, schedule and wiring materials, fuses, brushes, lamps, lamp guards, and other products. The entire assembly is neatly arranged, in a loose leaf leather binder, tabbed and indexed, together with carefully arranged lists of industries by groups.

G-E Home Building Program to Continue

Continuation of its large-scale demonstration home-building program for 1936 has been announced by the General Electric Company. The company itself will build no houses, but will again sponser a co-operative movement of material and equipment manufacturers, architects, builders, and other related groups, as it did in 1935, when more than 300 homes were built and opened to public inspection. General Electric will be responsible for another large field organization of 170 local committees to handle the administrative details of the plan, contributing to the make-up of these committees from its own personnel, and supplying much of the promotion necessary to make the program known to the general public.

Lack of Farm Wiring Inspection Worries Wisconsin

The affidavit method of securing compliance with the Wisconsin Electrical Code is not meeting with success in farm wiring. The plan of having the owner insist upon a contract binding the contractor to comply with the state Code and submit the job to inspection is not satisfactory because it is voluntary with the owner.

To correct this condition, the Wisconsin Electrical Association is working for a state licensing and inspection law. At the present time, it is stated, farm jobs are being done by everyone and anyone with no legal method of inspection.

The association reports that the Farm Mutual Insurance Companies will demand a certificate of inspection under possible penalty of cancellation of insurance.

Alameda Election

T. L. Rosenberg of Oakland, Calif., was elected president of the Electrical Contractors' Association of Alameda County to succeed Frank Boyd. William Bernhardt of Berkeley was elected vice-president, and E. A. Chloupek, secretary-treasurer. The board of directors includes the officers, past president and Fred Schmits of Oakland.

Farm Bill in Conference

Senate and House conferees on the Norris rural electrification bill are having some difficulty in reconciling conflicting provisions in the measure as passed by the two houses. Chief disagreements are over three points: Should privately-owned utilities be eligible for loans? What interest rate should be charged? Should REA personnel be under civil service or "on the basis of merit and efficiency without regard to the provisions of civil service laws," and without political bias, under the system used by TVA?

CLEARED EMERGENCY FLOOD JOBS: When the St. Patrick's Day flood occurred, R. C. Carmack, secretary-manager of the Electrical Contractors Association of Pittsburgh, Pa., was one of the first to receive temporary telephone service. Because few of the thirty-six contractors who belong to the association had telephone service, the association's office functioned as central headquarters for building owners to call in regarding emergency electrical work. About 1200 wiremen were quickly placed on various jobs, through the coordinating efforts of Mr. Carmack's office working night and day with various contractors, labor officials and the electrical inspection department. A special bulletin was prepared by the association which was distributed to business men inside the patrolled flood zone by twelve members of the local union. This bulletin explained the functions of the association's office as a clearing house for getting contractors started on safe temporary wiring. A list was made up of all the jobs as they were begun by the members. From this data it was possible to simplify many details of power company and inspection department procedure. Contractors were also saved much valuable time by being able to avoid duplications in sales effort through the reported list of job assignments. Mr. Carmack reports many contractors having already been authorized to plan their restoration work to include other modernization operations, such as better lighting, air conditioning, and other changes now made possible while plastering and general redecoration work is going on.

A New HOOK to Increase Your Portable Guard Sales

New Fool-Proof Strain Relief
Patents Pending
Large Flat Handle that Hooks Anywhere
No. 600 MR McGILL MFG. CO. VALPARAISO, IND.
Extra Heavy Electric-Welded Non-Rolling Cage
Twelve Hook-Handle Models

Here is a new and different portable guard feature to talk about and demonstrate. The open hook-handle is broad, flat and wide. It fits scores of places that the old wire hook would not fit. Hooks, and stays put, on a bench top, over a pipe, between joints — and it will stand upright as readily as it will hang. Makes the portable guard twice as handy as ever before. Has many other talking points, too! Extra heavy, electric-welded, double plated cage. New strain-relief, stronger, easier to wire, relieving all strain on socket connection.

The new McGill Catalog tells the whole story—write for your copy.

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Electrical Specialties of Quality
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NON METALLIC
PARKWAY CABLE

The conductors in CRESCENT NON-METALLIC PARKWAY (TRENCH) CABLE are insulated with long-aging, special moisture-resisting rubber, permanently sealed against moisture and thoroughly protected against mechanical injury by tough, non-inductive armor tapes, and the sheath is filled and sealed with non-hardening asphalt.

The cable is not affected by ground acids, alkalis or water, and is lighter, easier to handle, and less expensive than metallic parkway cable.

CRESCENT INSULATED WIRE AND CABLE CO.
TRENTON, N. J.

YOU CAN'T BEAT 'EM

Men responsible for plant maintenance have found the combination of TRICO FUSES and KLIPLOK Clamps best on any job and particularly on the tough jobs.

TRICO RENEWABLE FUSES

Give accurate, safe and efficient protection, year after year, because the casing is expressly designed to accommodate only the correct Superior Time-Lag Elements and not "foreign" links. For maximum fuse efficiency only the link designed for the particular brand of fuse should be used. Adopt TRICO with the ***non-interchangeable tamper-proof powder-packed link*** for 100% protection.

TRICO KLIPLOK CLAMPS

Use KLIPLOKS on old and new clips to eliminate destructive heating which causes no end of trouble and waste power. KLIPLOK Clamps assure positive contact by extreme pressure on fuse clips.

Write for Free Sample Using Your Organization Letterhead

TRICO FUSE MFG. CO., Dept. L, Milwaukee, Wis., U. S. A.

ADVOCATES TIE IN ON LIGHTING: More business is in sight for contractors who will get the feel of better lighting and who will seek the advice of power company specialists on their major efforts, in the opinion of F. J. Seastrunk of the Seastrunk Electric Company, Columbia, S. C. Mr. Seastrunk began in the electrical business in 1918, and now operates a branch office at Winsboro, S. C. Two other branch offices in nearby towns are now being considered. A commercial lighting specialist has been making some effective re-lighting sales for the company in Columbia and vicinity.

Since the end of the present session of Congress is by no means imminent, the conferees are indulging in the luxury of prolonged argument on these differences. Latest report is that at least two weeks will elapse before an agreement is possible.

SEES REINSPECTION OPPOSITION WANING: During the past few years the concerted efforts of property owners had seriously thwarted Atlanta (Ga.) reinspection work, says Dewey L. Johnson, superintendent of electrical affairs, and chief electrical inspector. This condition is said to be easing off now so that more favorable action is being reported from reinspection that are being made in various parts of the city.

Single Utility Outlet

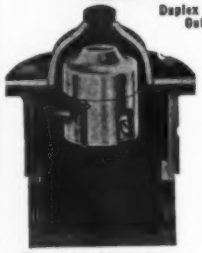
Build up prestige and good will by installing quality materials in all your jobs.

STEEL CITY PRODUCTS

Duplex Utility Outlet

help the electrical contractor gain a reputation, not only for furnishing quality products but workmanship as well, because they are manufactured in accordance with the workman's needs, insuring speedy, dependable performance at all times.

We manufacture a complete line of outlet boxes, covers, switch boxes, conduit fittings and electrical specialties, furnished in sherardized, galvanized, enameled or cadmium finish.



Watertight Floor Outlet

WRITE FOR OUR NEW CATALOGUE

STEEL CITY ELECTRIC CO.
PITTSBURGH, PENNA.

Gentlemen:

Please send a copy of your new catalogue to

Name .....

Address .....

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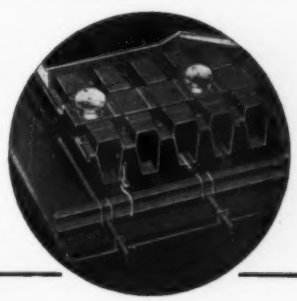
This illustration shows the Robertson floor cells with cell feeders being installed. Provision was made for five electrical services in the cells of the floor, including Bell Telephone, Inside Phone, Low Tension, High Tension and Lighting. This Eli Lilly building is really a challenge to science. No matter what complicated electrical devices become necessary in the business of the future, these offices will be able to install them quickly, efficiently and economically.

Protect YOUR CUSTOMERS' BUILDINGS AGAINST PREMATURE ELECTRICAL OBSOLESCENCE

YOU can do so by utilizing the electrical possibilities of the Robertson Steel Floor System on your jobs. This revolutionary floor offers 100% electrical availability. Every one of the parallel steel cells which compose it, is in reality a protected wire raceway of generous capacity. And the Robertson Floor, therefore, is able to take care of present and future electrical requirements efficiently and economically, no matter how comprehensive these requirements may be. The use of this floor system is definite insurance against premature building obsolesence, which so often means serious dollar loss to building owners.

In addition to its unique electrical advantages, the Robertson Floor usually results in substantial structural savings for your customers, too. And its use, in many cases, leads to a larger electrical contract, due to the overall area it serves. If you will read our brochure "New Life for Buildings" and our special technical bulletin containing complete details, we believe you will agree with us that the Robertson System not only gives your customers a better job, but also benefits you. So send for free copies today. Address H. H. Robertson Company, 2003 Grant Building, Pittsburgh, Pa.

This photo shows one of two stories added to an existing storage building of the Eli Lilly Company, Indianapolis, in which 23,000 sq. ft. of Robertson Flooring were used. It is planned to use the two additional floors for office space. Their erection, with Robertson Steel Flooring, did not prevent operations on floors below being carried on as usual.



ROBERTSON STEEL FLOOR SYSTEM

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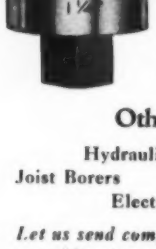
GREENLEE
PROFIT MAKERS
For The Electrical Contractor

THE greater the efficiency of the tools you use, the more chance you have of meeting competition and making a profit on each job. That is why Greenlee Conduit Benders and Knockout Tools are so popular. They cut costs on every job and are liked by the men who use them.

Hydraulic Conduit Benders

Greenlee Hydraulic Conduit Benders insure profits, because they bend conduit quicker and easier than by other methods. In addition, they make smooth, even bends, eliminating many fittings and making it easy to pull in wire and cable. They are easy to take to the job, too, because they are readily portable.



Knockout Tools

Greenlee Knockout Punches and Cutters are time savers and profit makers, because they make it easy to enlarge holes in switch boxes, cabinets, etc. They form clean-cut holes quickly and accurately, without any reaming or filing.

Other Tools

Hydraulic Pipe Pushers
Joist Borers — Bit Extensions
Electricians' Bits

Let us send complete information, without obligation to you. Just use the convenient coupon.

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Please send complete information on the following:
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☐ Knockout Tools

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Street .....
City .....
State .....
My Jobber is 5-36

A Roll o' Tape

Field notes about men of the contracting shop, and inspection branches of the industry

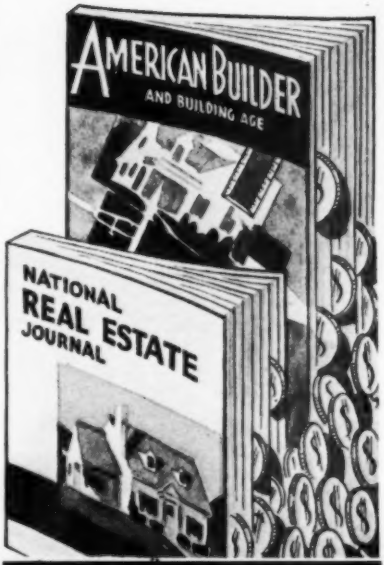
ONE of the very first automobile sales rooms to be re-lighted with combination Mazda-H.I.M.V. falls to the credit of the Abbott Electric Co., Miami, Fla. Five totally indirect commercial units did the job to the satisfaction of all concerned.

TO balance a steady commercial and residential wiring business with wholesale and retail major appliances sales, the Byck Electric Co. of Savannah, Ga., employs a commercial and residential lighting specialist.

TWO specialties that provide important seasonal fill-in work for shop-men of the Childers Electric & Paint Co., of Louisville, Ky. are fan repairs and iron repairs. Separate bins are provided containing replacement parts for almost any make of iron or fan. These are side-lines to a large motor service shop and contracting department. A recent addition of paints, in charge of a graduate chemist, is reported to be coming along fine for this pioneer company.

A NEW name for a well-known item has been coined by J. M. (Jimmy) Feltman, lighting specialist of the Simmons Electric Co., Birmingham, Ala. Those dear old lamps, whether heir-looms, wedding gifts, antiques, or what have you, he calls "sentiment lamps." Respect them, and be extra nice to their owners when making old lamps over into modern lighting equipment, says Jimmy, because it often paves the way to more worthwhile things electrical.

EVERY job that has been laid out since December 1935 by Ray W. Chanaberry, Inc., electrical engineers of Louisville, Ky. has used 30 per cent rubber insulation. This included com-



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Helps You Profit
in the
BUILDING MARKET

3 Billion Dollar Building Program
Steps Up Emerson Exhaust and Ventilating Equipment Sales

Facts: Conservative estimates indicate 250,000 new homes will be erected in 1936—dollar volume $1,200,000,000—100% increase over 1935.

New factory construction estimates exceed 1935 by 50%.

Modernization of homes, retail stores, apartments, factories estimated at 2 billion—twice the amount of 1935.

That's the market we're invading with Emerson Exhaust and Ventilating Fan advertising in the American Builder, National Real Estate Journal and a regular schedule in Chain Store Age. That's the market, Mr. Electrical Contractor, that is being made conscious of the importance of ventilation—the market that will include in its expenditures immense amounts for Exhaust Fans, Ventilating Fans, Air Circulators, Oscillating Fans and Ceiling Fans. You are the logical source of supply—and Emerson is ready with the most complete selection of quality fans in America.

Emerson Exhaust and Ventilating Fans are of superior quality, time tested for years, proved in every conceivable service to give long life and quiet, trouble-free performance at low cost. Don't pass up your share of these new Fan Profits.

Write for Complete Details Today

Ask for EMERSON EXHAUST and VENTILATING FAN Plan for 1936

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MOTORS — FANS — APPLIANCES
Leaders in the FAN and MOTOR INDUSTRY since 1890

"What are the products in the X-Y-Z line?" a buyer asked—

Use
THE BUYERS
REFERENCE NUMBER
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ELECTRICAL CONTRACTING
to find out
What to Buy—Where to Buy it
Who Makes it

TRADE NAME INDEX

—Flexible Non-Metallic Conduit, ...o., (Elmwood), Hartford, Conn.
...Non-Metallic Sheathed Cable, ...o., (Elmwood), Hartford, Conn.
—Wood Molding, Mitchell Mould... ...01 Circle Ave., Forest Park, Ill.
... Clamp Co., 49th & Grays Ave., ...a, Pa.
...inery Corp. of America, New ...rk.
...Co., (Elmwood) Hartford, Conn.
...er Co., 727 Eastham Ave., E., ... Ohio
—Unit Resistors, Ohmite Mfg. ... Albany Ave., Chicago, Ill.
...5221 Greene St., (Germantown) ...a, Pa.
...nit Resistors, Wirt Co., 5221 ... (Germantown) Philadelphia,

—Clothes Washers, Pine-Ihrig ...o, Oshkosh, Wis.
... Aluminum Foundry Co., 16th & ...s., Manitowoc, Wis.
... Electrical ... W...
...St., Milwau...
...ING Corp... ...a, Ohio
...e Co., J., 3...

...Portable B... ...Corp., Lanc... ...ectric Tool... ...g, Ill.
...g, M. J., ...

...Health and... ...55 E. 11th ...ann Mfg. ... Md.
...—Sheet an... ...ere Copper & Brass, Inc., 230 ... New York, N. Y.
...Tube Co., 1411 Central Ave., ...th.
...RIEND—Clothes Washers, Bluff... ...o, Findlay, Ohio
...Hand and Power Conduit Bend... ...ean Pipe Bending Machine Co., ...St., Boston, Mass.
...tic Co., C. D., 826 Broadway, ...N. Y.
...tries Inc., Gar, 7924 Riopelle ...t, Mich.
...Co., John, Conshohocken, Pa.
...rving Corp., Koppers Bldg., Pitts...

...l & Tool Co., Piqua, Ohio
...Co., Daniel, 15 N. Jefferson St., ...ll.
...Mfg. & Supply Co., R., 65 Carle... ...bridge, Mass.
...Washer Co., Oskaloosa, Iowa
...& Edwards, 225 S. State St., El...

...ine Co., S. A., 27 Damrell St., ...ss.
...Inc. T. B., Chambersburg, Pa.

WRIGLEY Co., Thomas, 613 W. Lake St., Chicago, Ill.
WRINKLET—Sockets, Bryant Electric Co., 1420 State St., Bridgeport, Conn.
WROUGHT Washer Mfg. Co., 2100 S. Bay St., Milwaukee, Wis.
WT—Cable Lugs, Wolverine Tube Co., 1411 Central Ave., Detroit, Mich.
WUELKER Flexo-Dome Co., 195 Fremont St., cor. Howard, San Francisco, Cal.
WURDACK Electric Mfg. Co., Wm., 4404 Clayton Ave., St. Louis, Mo.
WYCKOFF Pipe & Creosoting Co., 522 Fifth Ave., New York, N. Y.
WYR-WAY—Ornamental Metal Raceway Moulding, Knapp Bros. Mfg. Co., 220 Scott St., Joliet, Ill.
WYZENBECK & Staff, 566 W. Washington Blvd., Chicago, Ill.

—X—

X-CEL-ALL Co., Monaca, Pa.
XDUCT—Steel Conduit, America... Circular Loom Co., 205... ...ork,

X-Y-Z—Concentric Cable, Flexible Steel Armored Cable, Flexible Metallic Conduit, Flexible Non-Metallic Conduit, Asbestos Covered, Heavy Duty and Twisted or Parallel Cord, Friction and Rubber Tape, Lead Sheathed and Rubber Covered and Braided Wire. John Doe Mfg. Co., Jonesville, N. Y.

—Y—

YAGERS—Soldering Flux, Benson Co., Alex. R., S. Bay Rd., Hudson, N. Y.
YALE & Towne Mfg. Co., 4530 Tacony Ave., Philadelphia, Pa.
YANKEE—Pocket Ammeters and Voltmeters, Lundquist Tool & Mfg. Co., 57 Jackson St., Worcester, Mass.
YANKEE—Angle and Ratchet Braces, Hand and Breast Drills, Screwdrivers, North Bros. Mfg. Co., American St. & Lehigh Ave., Philadelphia, Pa.
YAXLEY Mfg. Co., 3029 E. Washington St., Indianapolis, Ind.
Y-M—Motor Operated Door Openers, Yoder-Morris Co., 5500 Walworth Ave., Cleveland, Ohio
YODER-MORRIS Co., 5300 Walworth Ave., Cleveland, Ohio
YORK Oil Burner Corp., York, Pa.
YOST Mfg. Co., Meadville, Pa.
YOUNG Bros. Co., 6500 Mack Ave., Detroit Mich.
YOUNG Co., A. B., Fair Haven, Vt.
YOUNG & Franklin Tool Works, 107 N. Franklin St., Syracuse, N. Y.
YOUNGSTOWN Sheet & Tube Co., Stambaugh...

He had the whole story in one minute!

Thanks to the Buyers Reference Number of Electrical Contracting, it's a simple matter to locate a given product when only the trade name is known.

The trade and company name index immediately locates the manufacturer. Reference to the classified directory gives further details with more specific data on the product . . . and in many cases, a complete catalog of this manufacturer will be found in the products exhibit section.

Keep this book handy in making up specifications and planning future buying. It will save time and simplify your work.

ELECTRICAL CONTRACTING
330 West 42nd St., New York, N. Y.

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BUYERS REFERENCE NUMBER OF ELECTRICAL CONTRACTING
— to save time and money in your buying

THE BEST TAPE MADE

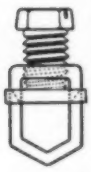
YOUR JOBBER HAS IT

SIMPLE, ISN'T IT?

ILSCO

SOLDERLESS CONNECTOR

NOTICE: The *triangular wedge* formed by the tang and V-bottom collar, which forces the wire into a *solid mesh*—



NO set-screw contact . . .
NO flattening or separating of wires . . .
NO limitation to one size wire . .
NO shearing effect whatsoever . .
NO special tools required to make connection . . .

NO need for you to search any longer for the PERFECT Solderless Connector—WE HAVE IT!

Ilsco solder lugs show the size of the largest wire they will take.

FREE—A large display board, containing mounted samples of ILSCO lugs. Sent upon request.

ILSCO COPPER TUBE & PRODUCTS, INC.
5629 Madison Road, Cincinnati, Ohio

mercial and industrial work to the tune of about $900,000 for six months ending March 1, 1936. Proving that a good wiring layout is no better than its insulation.

WITH a local Electrical Progress Exhibit planned for Cincinnati, O., in March, P. W. Schath of the P. W. Schath Electric Co., was enthusiastic over plans for a contractors' association educational booth for that occasion. One of his "hunches" was to remind visitors to the booth that contractors would gladly make free inspections of their premises to point out any electrical hazards.

HAVING come up from the ranks of motor winders who learned connections by heart, J. M. Braswell of the Commercial Electric Co., Savannah, Ga., warns shop operators to wean their mechanics from the connection print habit, if speedy work is to be expected.

THIS beauty salon business means wiring aplenty, according to L. A. Dunn of the Dyer Electric Co., Birmingham, Ala. When their big local department store job was revised to include a beauty parlor, it required seven 1¼-in. conduits containing multiple feeders to supply this department. The slab was already poured, and 1¼-in. was all that could be concealed in the floor fill.

DEPRESSION let-ups in service shop business offer hustling shop operators a good chance to make valuable time-saving improvements to their equipment at little expense, says R. A. Hewgley, Nashville (Tenn.) Armature Co. A heavy-duty motor-driven wheel press; a mechanical stoker; a useful adjustable lathe motor bracket, with its tiny oil immersed reversing switch; and a ceiling air circulator, are items that were made up in his shop during spare hours.

PERIODIC inspections and trial operation of circuit breakers and other over-current devices are rather important, cities E. H. Rueppel, Kentucky Electrical Inspection Bureau of Louisville, when a 35 h.p. a.c. pump motor recently stalled after its pump became clogged with sand, the controller overload relays failed to open, and a sub-feeder panel circuit breaker of 150-amp. capacity also remained closed. The heavy current inrush finally burned off a 150-amp. busbar connection in this feeder panel. All the while an 800-amp. main breaker held in circuit at the main switchboard. Mr. Rueppel surmises that the industry has overdone its job of selling, when owners are told they can install certain types of electrical apparatus and proceed to completely forget it. Now

WHICH IS BETTER?

IDEAL

WIRE CONNECTORS

IDEAL WIRE CONNECTORS save money on all wire joints. Better electrically and stronger mechanically than solder and tape. Easy to use. Require no tools to apply. Fully approved. Listed by Underwriters' Laboratories.

TEST SAMPLES

Take us up on this offer. Send for test samples today.

IDEAL COMMUTATOR DRESSER CO.
1041 Park Ave. Sycamore, Illinois

MINERALLAC

Cable or Conduit Hanger

Jiffy Clip

Now furnished in EVERDUR as well as Cadmium Plated Steel.

Cable or Conduit Hanger
Rigid Conduit—⅜"—2½"
Thin Wall—½"—1½"

Jiffy Clip
Rigid Conduit ⅛"—1¼"
E. M. T. (Thin Wall) ½" & ¾"
Also BX Cable

Ask your Jobber

MINERALLAC ELECTRIC CO.
25 No. Peoria Street, Chicago, Ill.

New York City Branch
381 Fourth Avenue

The 1936 Edition Now Ready!

"VERIFIED" DIRECTORY

of

ELECTRICAL WHOLESALERS

Information Given For Each House Includes:

Name and address of firm.
Branch and affiliated houses.
Names of officers and department managers.
Name of purchasing agent.
Territory covered.
Number of salesmen—city, country, counter.
Floor space occupied.
Regular Inventory.
Lines handled—supplies, appliances, radio, fixtures.
Year business was established.
Memberships in national and local wholesaler associations.

This complete information given on:

760 Independent houses.
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245 National houses.

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149 Non-electrical wholesalers maintaining electrical departments including 69 hardware, 16 general, 9 plumbing, 49 mill and 6 automotive supply houses.

Completely Revised with Many New Listings

The 1936 Verified Directory is an indispensable sales tool for Electrical Manufacturers.

Every listing has received an official O.K. or necessary changes have been made.

Every qualifying electrical wholesaler is included.

A continuous search for new houses has been going on since the 1935 Directory was published.

No house is listed whose business is less than 75 per cent wholesaling.

This is in line with the more strict definition of a wholesaler recently adopted by both NEWA and the National Council of Local Associations. The only exceptions are those approved by these groups.

SINGLE COPIES - $15.00

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330 WEST 42nd STREET NEW YORK, N. Y.

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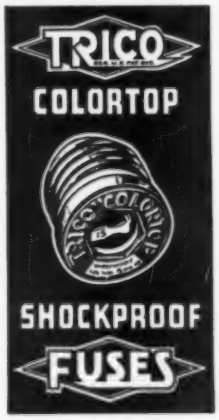
Customers Appreciate Your Recommendation of

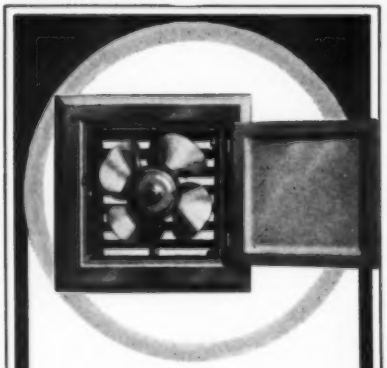


- The Size is known by the color.
- Shock and vent proof top.
- Cadmium Plated Metal Parts. Prevent corrosion. Make better contact.
- Packed in neat 5-unit carton—10 cartons in attractive display box.
- Each fuse bears Underwriters' Label.
- A million in a million show when they blow.

Send for FREE Sample

using your organization letterhead

TRICO FUSE MFG. CO.
Dept. I, Milwaukee, Wisconsin



Automatic Wall Box Kitchen Ventilator Fan

Built-in type for permanent installation, it is telescopic in design, adjustable to wall thickness 7" to 13". No wood or metal frame or screws in the plaster, wood, or brick necessary. Inside and outside polished cast aluminum; wall box rust resisting steel. Quickly installed in old or new homes. Automatic switch and shutters controlled by opening and closing of the door. 10" silent blade fan; available for A.C. or D.C.; A.C. non-radio interfering. Write for bulletin and prices.

SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan, U. S. A.

OFFICES IN PRINCIPAL CITIES

SIGNAL

what's needed, says Rueppel, is re-education as to what constitutes practical money-and-time-saving maintenance of valuable apparatus.

THOMAS O'FLANAGAN of the O'Flanagan Electric Co., Titusville, Fla., swears he will never again give out separate labor and material bids on a gasoline service station. After having recently given such a bid, itemizing his items of material therein, he got the labor only. Amazed at the close outcome of materials actually used, he learned that the corporation made their purchases exactly as he had submitted his list.

AFTER the Willey-Wray Electric Co. of Cincinnati, O., had built its own large test switchboard, it was so well liked by various machinery manufacturers, according to Frank W. Willey, that twelve somewhat similar boards have been sold by his company. These outfits, costing upwards of $3,500 each with motor generator equipment, were bought by such organizations for conducting tests on various sizes and types of motor driven machines.

THE scrappy looking "leatherneck" that appears on the electric sign and other advertising matter of the Marine Electric Co., Louisville, Ky., industrial and commercial contractors, isn't the original basis for this company name. Back in the busy Ohio river traffic days this company specialized in electrical work on all types of river craft, and still do some of it now and then.

USUALLY a set of large armature coils are impregnated after they come off the loop winder, and must then be baked 4 or 5 hours before they are dry enough to be formed on the coil spreader. An emergency armature rewind job was recently turned out at Atlanta, Ga. by S. H. Browning of the Cleveland Electric Co., where these loops were dipped in a thinned solution of quick drying insulating glue. They were dry and compact for forming after a 20-minute baking. As a result an armature which came in at 3 P.M. was rewound that same evening, given a thorough impregnation, baked all night, re-banded the next morning, and put back in service by noon.

TRENDS—Lamp ratings of 750, 1,000 and 1,500 watts for high intensity commercial lighting having definitely arrived, what about a canopy or chain-link pull switch for such purposes that can really "take it," asks R. W. Robinson, Robinson Electric Co., Charlotte, N. C. Not always in re-lighting a store, office or restaurant to Better Light—Better

Just out—

New 1936 Third Edition

***Abbott's* NATIONAL ELECTRICAL CODE HANDBOOK**

—covering latest Code rules

By ARTHUR L. ABBOTT. Third edition, 545 pages, 5x7½, flexible, fully illustrated, $3.00

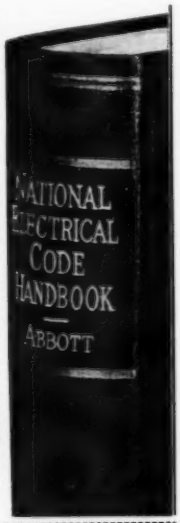
How this book helps you:

—Simplifies and explains the National Electrical Code
—Enables the user to grasp readily the plan, scope and purpose of the National Electrical Code requirements
—Groups Code rules in practical, handy way, according to jobs to which they apply
—Clarifies rules with simple discussions, diagrams, and illustrations
—Certifies your methods; keeps you up-to-date. helps your work pass official inspections

Here is a complete revision of Abbott's useful Handbook, covering all changes, new rules, etc., in the latest National Electrical Code. Use this book to get work done according to the Code. Gives rules and requirements for all jobs—what they mean—how to apply them. An unusual book, planned for quick reference use by busy, practical men.

Valuable data for the electrician, inspector, contractor and architect

—definitions of the terms used in the Code
—types of wiring approved under given conditions
—requirements pertaining to standard materials and apparatus and to the standard methods of installing such materials and apparatus
—general requirements applying to all wiring systems
—automatic overload protection covered both in section on general requirements and in connection with specific applications
—simplified application of Code data pertaining to motor installations
—special requirements pertaining to emergency lighting, high-voltage equipment, services, grounding, design of installations, etc., etc.



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Send me Abbott's National Electrical Code Handbook for 10 days' examination on approval. In 10 days I will send $3.00 plus few cents postage, or return book postpaid. (We pay postage on orders accompanied by remittance.)

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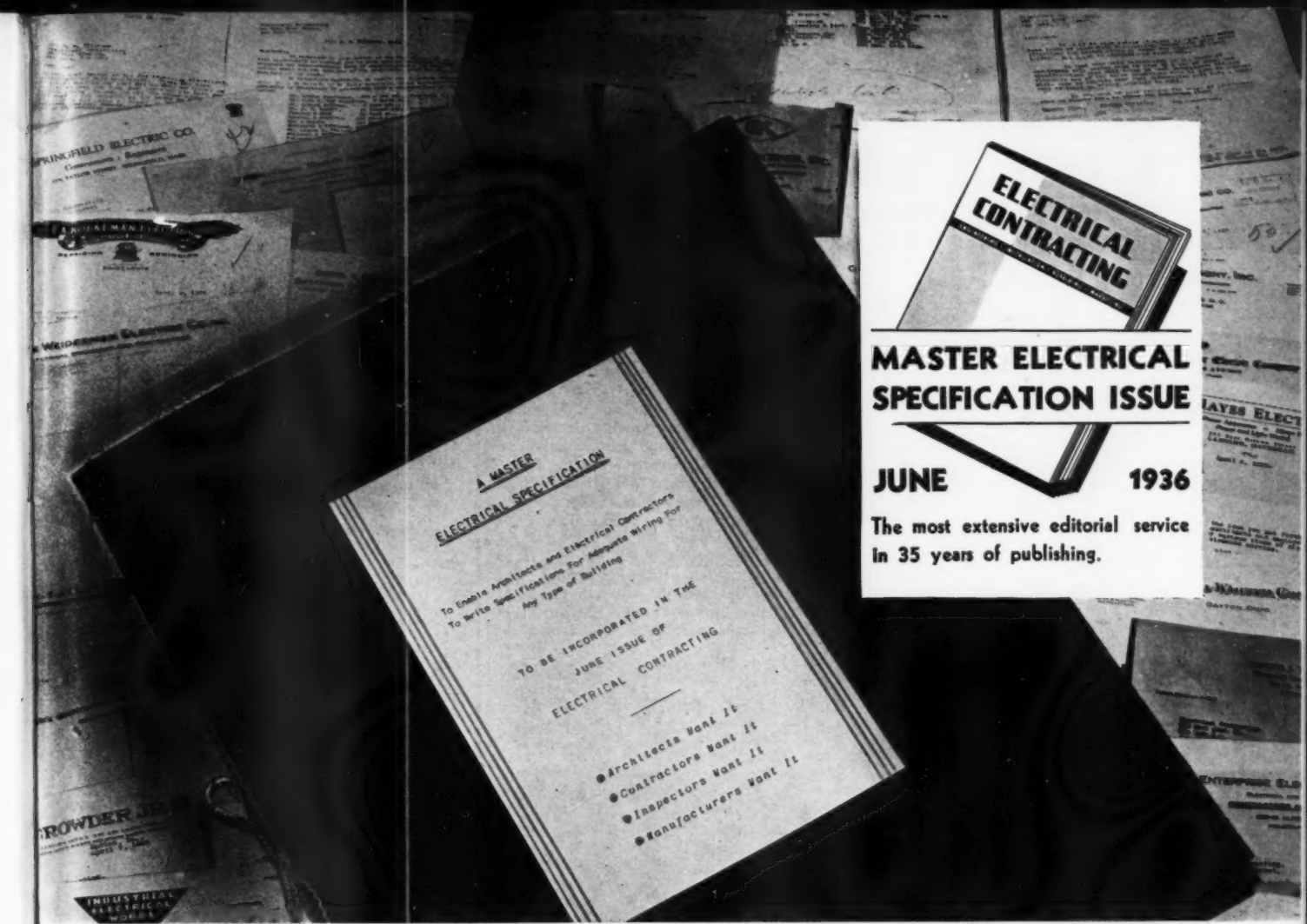

ELECTRICAL CONTRACTING
MASTER ELECTRICAL SPECIFICATION ISSUE
JUNE 1936
The most extensive editorial service in 35 years of publishing.
A MASTER
ELECTRICAL SPECIFICATION
To Enable Architects and Electrical Contractors To Write Specifications For Adequate Wiring For Any Type of Building
TO BE INCORPORATED IN THE JUNE ISSUE OF
ELECTRICAL CONTRACTING
Architects Want It
Contractors Want It
Inspectors Want It
Manufacturers Want It

This Story of the MASTER ELECTRICAL SPECIFICATION is the story of increased sales for electrical manufacturers

Inadequate wiring will continue to be the *industry's problem* unless something is done about it.

And this condition will mean a continued loss of business for *every electrical manufacturer.*

One of the sources of inadequacy is the group of men who write specifications that leave room for minimum wiring and cut-throat bidding.

ELECTRICAL CONTRACTING has taken the lead in a movement to remedy this condition in one extensive operation—"The Master Electrical Specification Issue," to be published in June. The recent announcement of this issue brought a flood of letters of unqualified approval from electrical contractors and engineers.

The June issue offers the greatest opportunity in many years for sales-producing advertising. The complete story of this issue, published in book form, as shown above, is available to all manufacturers. WRITE TODAY.

Address **ELECTRICAL CONTRACTING**
330 West 42nd Street, New York, N. Y.

MASTER ELECTRICAL SPECIFICATION ISSUE - ELECTRICAL CONTRACTING - JUNE 1936

UMI

KILLARK
EXPLOSION PROOF CONDUIT FITTINGS

for use in hazardous locations where explosive vapors are found. Eliminate dangers from explosions caused by short-circuits and arcing switches.

WRITE FOR BULLETIN

Every needed size and type of explosion proof fitting.

Made of unbreakable malleable iron . . . cadmium plated.

Manufactured by

KILLARK ELEC. MFG. CO.

3940 EASTON AVENUE ST. LOUIS, MO.

Entrance fittings	Explosion proof fittings
Conduit bodies	Bell transformers
Vaporproof light fittings	Fuse panels

Sight standards is it practical to provide panelboard switching or to set a heavy-rating ceiling pull switch beside the luminaire outlet.

REGULAR annual calendar mailings have been kept up during the lean years by Fulton Bros. Electric Co., Atlanta, Ga. The expense is offset by having developed one of the largest lamp businesses among the contractors of Atlanta, says T. Hermon Fulton.

STORE owners who complain about having to re-wire bad store wiring in the city of Miami, Fla., receive an intriguing reply from Ellis C. Knox, chief electrical inspector. He tells them to keep on throwing away their money for lost current for another sixty days or so. They usually ask for more details, and he then cites some recent power loss analysis to prove his point. For instance, a recent re-wiring job of $156 cut a storekeeper's light bill from $56 per month to $26.

WITH so much agitation going on to promote H.I.M.V. lighting, Ray W. Chanaberry, Inc., Louisville (Ky.) electrical engineers, are trying out an indirect unit in one of their own draughting rooms. The 400-watt vapor unit is blended with four 300 watt mazda lamps.

JUST to show how air conditioning and good store lighting build up service capacities, a department store remodelling job now under way at Birmingham, Ala., has three runs of 5-in. main feeder conduit, each containing four 1,000,000 c.m. cables. That for a 100-ft. by 100-ft. 4-story building. The work is being installed by the Bagby Elevator & Electric Co., local contractors.

ELECTRICAL jobs usually happen when buildings go up, but the Peters Electric Co. has a nice re-wiring job because an old commercial building in Atlanta, Ga., is coming down. An original 8-story office building will soon be only two stories—and with new wiring, of course, because of modernization.

THE value of distinctive employee uniforms is cited from a recent experience of George La Vigne of Miami, Fla. While the Geo. La Vigne Co. had some men working in an exposition building, a purse disappeared from the temporary office of a lady lecturer, who claimed some electricians had been working in the room. She quickly exonerated the La Vigne men when she saw their attire.

THE **Badger**

50 AMPERE

Synchronous

TIME SWITCH

. . . dependable

. . . at low cost

Here is a time switch that you can depend upon to give absolutely satisfactory service.

Sell quality and eliminate costly service calls.

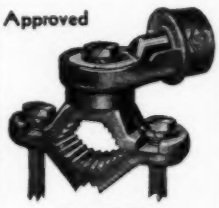
See your wholesaler or write for complete descriptive literature.

RELIANCE AUTOMATIC LIGHTING CO.

1937 Mead Street Racine, Wis.

SHERMAN
RIGID GROUND FITTINGS

Approved



GF 5 FITTING FOR RIGID CONDUIT

SOLDER AND SOLDERLESS

This Fitting is manufactured in a manner which provides absolute protection to the ground wire connection. Made with a heavy cast brass soldering lug which allows a soldered or a solderless connection. Adjustable to any position, easy to install as clamping screws need not be removed. Pipe clamp may be reversed for use with ground rod.

Sold Thru Jobbers

Send for bulletin No. 12 describing complete line

H. B. SHERMAN MFG. CO.

BATTLE CREEK, - - MICHIGAN

New Products . for May . . . .

Recording Voltmeter

Strip-chart voltmeters with a range of 0-150V., made with motor drive (type CD-23), or with spring-clock drive (type

CD-24). Said to be simpler in design yet to incorporate many standard features such as self-winding chart reroll, magnetic damping and metal shielding against stray field effects, and accuracy within 1 per cent of full-scale value when periodic checkings are made. Standard binding posts are provided on the back, a resistor cage is mounted in place of the back housing, and the hinged-window cover is eliminated. The roll drive speed is 3 in. per hour. Other gear ratios are available. A compact cast-aluminum frame is used resulting in a weight of only 25 lb. for this instrument. General Electric Co., Schenectady, N. Y.

Splash-Proof Motor

Squirrel cage motors types E, EN and EH, in ratings from ½ to 200 hp. which employ enclosing features that are said to completely shield their inner parts from splash or spray. Ventilation is maintained by small air intake openings

in the end bells, and by air exit louvres underneath the motor. The stator windings are claimed to be impregnated and sealed with water-repellent varnish and finished with oil-proof varnish. Available for all voltages and frequencies in constant speed and multi-speed, continuous or intermittent duty. The Imperial Electric Co., Akron, O.

250-Watt H.I.M.V. Lamp

A high intensity mercury-vapor lamp which is rated at 250 watts, has a standard screw base, and a single clear glass tubular bulb similar in appearance to the double-bulb 400-watt lamp. The 250-watt lamp is only 8 in. long overall. It is said to have an efficiency of 25-30 lumens per watt, an average operating life of 2,000 hours, and may be burned in a vertical, horizontal or angular position. Claimed to produce as much light as is delivered by 425 watts in incandescent lamps, it is recommended for applications which do not permit the use of

400-watt H.I.M.V. lamps, such as in low bays. Special individual transformers or reactors are required for each lamp. The lamp illustrated was made by the General Electric Vapor Lamp Co., Hoboken, N. J. This announcement, however, has been prepared to cover somewhat similar descriptive and performance data that was furnished us for 250-watt H.I.M.V. lamps now also being made by the Westinghouse Lamp Co., East Pittsburgh, Pa.

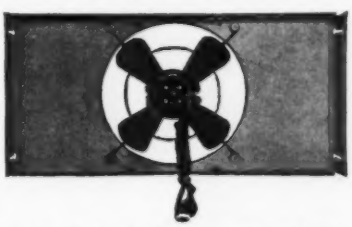
Corrosion Resistive Conduit

A non-ferrous, non-magnetic alloy is used in making "Suparduct" rigid conduit which is said to resist acid fumes that are present in many industrial atmospheres. It is also recommended for exterior work on white masonry structures where the prevention of stains or streaks from corrosion of surface wiring is sought. This conduit is made in sizes

and other physical details similar to steel conduit and may be installed with the same tools. "Suparduct" is said to weigh about one-third the weight of steel conduit. National Electric Products Corp., Pittsburgh, Pa.

Window Ventilating Fan

The Wagner No. 5560W 10-in. window ventilator is provided with adjustable mounting panels that are said to be easily installed so as not to interfere with the operation of windows. Mounted on a gray finished sheet steel



panel 11¼ in. high, and adjustable for windows 23 to 36 in. wide, it is said to exhaust 570 cu.ft. of air per minute. Wagner Electric Corp., St. Louis, Mo.

Hook-Over Live Cable Connector

The "Hottap" line of solderless connectors can be hooked over live or dead transmission lines with an operating stick, after which the suspended tap cable's weight helps to hold the clamp on the line. Only two moving part are used, made of copper alloy, while an eyebolt made of Everdur is designed to fit standard operating sticks. Made in six sizes to accommodate from No. 8 to 700,000 c.m. line

cable. The tap connector range is from No. 8 to 4/0. "Hottaps" are made for

For

Residence Wiring

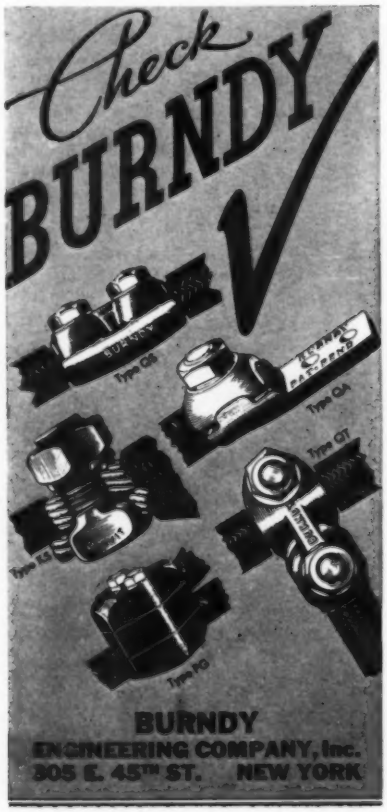
The Best and Safest Method is a properly installed KNOB and TUBE job. Be sure and get the

TRADE MARK Bull Dog REGISTERED

Assembled Knob because it "HAS A GRIP LIKE ITS NAMESAKE."

ILLINOIS ELECTRIC PORCELAIN CO.

MACOMB, ILLINOIS



use with copper or aluminum wire or cable line and tap connections. Burndy Engineering Co., Inc., New York, N. Y.

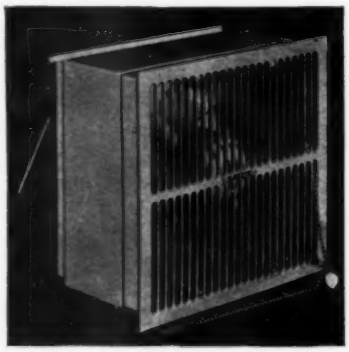
Many-Purpose Pulling Tool

Re-published from our April issue due to an error of illustration. A compact tool for hoisting, pulling or other heavy jobs where space or head room is limited. It is made in ¾, 1½, 3, and 6-ton capacities.

Known as "Pullift," it has been designed for quick one-man operations where light weight and ease of operation are necessary. A ratchet lever is used which permits short strokes of the handle at any point in a complete circle. Direction of hook travel is governed by a pawl that is controlled on the handle grip. A self-actuating brake is said to elimmate handle whip. Yale & Towne Mfg. Co., Philadelphia, Pa.

Built-in-Wall Ventilator

The Ilgette line of kitchen ventilators consists of built-in-wall, portable window, window built-in, and transom types, all rated 400 c.f.m., 45 watts. The built-in-wall type shown is furnished complete with fan, grille, and a cabinet that includes a telescopic sleeve to fit different wall thicknesses. By loosening two screws the fan unit may be removed from the cabinet. A beaded nickel silver pull chain starts the fan and opens the weather tight outer door, and when this chain is released the operations are reversed. Cabinet finish baked cream enamel, with a



bright polished metal grille. Ilg Electric Ventilating Co., Chicago, Ill.

Stator Winding Tool

A "gun" for use in winding small stators. The wire passes through this tool, which is used to push or pull the conductors through the stator and lay them in the slots. This tool is claimed to increase output up to 2 or 3 times. In jobbing work it is claimed that good operators put on 40 to 60 turns per minute, while quantity production is at a higher rate. Its maximum capacity

(for men operators) is about No. 14 B & S gauge, and its minimum is No. 32 for the grade "A," and No. 28 for the grade "B" gun. P. E. Chapman Electrical Works, St. Louis, Mo.

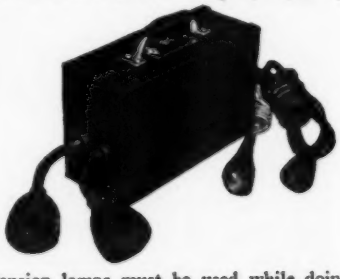
Clock Illumination Fixture

A shade and cord assembly for attachment to G-E commerce model electric clocks for illuminating their dial. Consisting of a cordset, 7½-watt bulb and shaded clamping fixture for attachment

to the upper edge of the clock case, it includes a molded through-cord current tap into which the clock may be plugged, so that the new cordset serves lamp and clock motor alike. General Electric Co., Appliance and Merchandise Dept., Bridgeport, Conn.

Inspection Light Transformer

A portable unit for transforming 110-V., 60-cy., current to 32-V. to reduce shock and explosion hazards where ex-



tension lamps must be used while doing maintenance or inspection work in damp or explosive atmospheric areas. Acme Electric & Manufacturing Co., Cleveland, O.

Trade Notes . . .

Raco and All-Steel Combine Sales

The Roach-Appleton Manufacturing Co., South Bend, Ind., and All-Steel Equip Co., Inc., Aurora, Ill., have combined their selling organizations. Hereafter both Raco and All-Steel products are to be distributed by the latter company. J. J. Madden of Roach-Appleton will direct sales. He will be assisted by Ralph F. Hinchman of All-Steel Equip.

New Rome Organization

H. T. Dyett and other former associates in the Rome Wire Co., announce the formation of the Rome Cable Corp. This company will manufacture copper rods, bars, bare and insulated wires and cables, with plants and general offices at 330 Ridge St., Rome, N. Y. The officers are: Mr. Dyett, president; H. W. Barnard, vice-president and treasurer; C. A. Scott, vice-president and sales manager; A. D. R. Fraser, secretary; V. W. Collins, assistant treasurer and comptroller; and, P. A. Williams, plant manager.

Wolverine Tube Co., Detroit, Mich., anounces the appointment of the following representatives: J. C. Neville Co., 211 E. 14th St., Kansas City, Mo., for western Missouri, Kansas, Nebraska and Oklahoma; Earl L. Miller, 1305 Culver Rd., Rochester, N. Y., covering all of New York except the Metropolitan area, and A. C. Tomb, Mansfield, O., for Ohio, Indiana, Covington, Ky., Parkersburg and Huntington, W. Va

The Mercoid Corp., Chicago, Ill., has opened a branch office and warehouse at 25 Ivy St., Boston, Mass., with A. W. Barr in charge.

Trade . . . . . .

Literature . . .

Electrical Specialties: A 16-page, loose-leaf catalog of the "Morse Eureka" line includes: Lamp guards; lamp socket adapters; socket extensions; wire connectors; Ediswan or bayonet sockets and plugs; binding posts; wire terminals; special plunger, turn-button, lever and push-pull switches; instrument lamps, and other specialties. Frank W. Morse Co., Boston, Mass.

Knob-and-Tube Wiring Manual: The Fact Manual illustrates N.E.C. wiring methods for concealed knob-and-tube wiring and open cleat wiring. A series of detailed drawings together with explanatory notes are combined with statements about porcelain wiring materials, on an 18-in. by 21-in. folded chart. Standard Electrical Porcelain Manufacturers, Chicago, Ill.

Lugs and Sleeves: Trade bulletin form 528 covering copper soldering lugs and splicing sleeves. Wolverine Tube Co., Detroit, Mich.

Protective Coating: Engineering folder and 12-page booklet covering characteristics and uses for Plicote, a paint-like industrial coating which is said to resist acids, alkalis, brines and other corrosive agents. The Watson-Standard Co., Pittsburgh, Pa.

Residential Lighting Fixtures: Chase "Even-Glow" lighting fixtures, also striking "before-and-after" examples of residential illumination are illustrated in an 18-page booklet—"Saving Your Eyes with Correct Lighting." Chase Brass & Copper Co., Inc., Waterbury, Conn.

Rural Line News: The first issue of "Rural Line Construction News" describes and illustrates by photographs and drawings several examples of rural transmission line design and construction. Volume 1, Number 1, is a neat folder containing eight short articles, nine photographs, two drawings, and some tables. Copperweld Steel Co., Glassport, Pa.

Electrical Instruments: Bulletin No. 5012 describes the Rawson Twin Multimeter for measuring a.c. and d.c. voltages and current of wide range. Rawson Electrical Instrument Co., Cambridge, Mass.

Capacitors: The Dykanol line of transmitting capacitors, and other units for industrial applications are illustrated in a 24-page catalog No. 127. Technical information is also included. The Cornell-Dubilier Corp., New York, N. Y.

Motorized Speed Reducers: Bulletin No. 22-3 covers Janette motorized speed reducers from 1/50 to 5 hp. Janette Manufacturing Co., Chicago, Ill.

Motor Protection Tables: A 6-page motor wiring wall chart covering recommended wire sizes, branch circuit and motor-running protection for single, two, and three-ph., and d.c. motors, from 110 to 550 V., and from 1/6 to 200 hp. The application and operation of "Fusetrons" for motor protection in accordance with N.E.C. rules is explained. Bussman Manufacturing Co., St. Louis, Mo.

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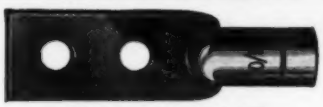

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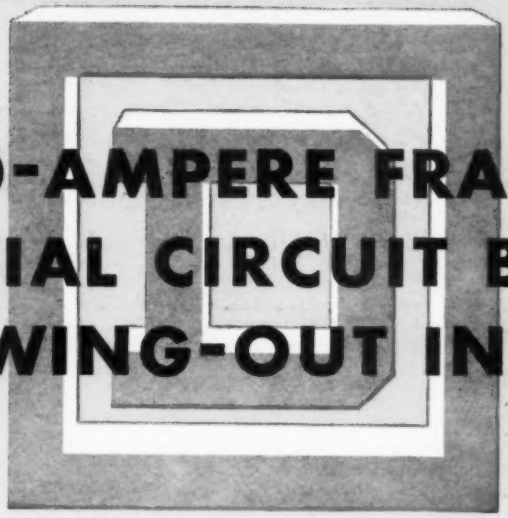

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